THE WILEY AGRICULTURAL SERIES

EDITED BY

J. G. LIPMAN, B.Sc., A.M., PH.D., D.Sc.

DEAN OF AGRICULTURE, RUTGERS COLLEGE AND THE STATE UNIVERSITY OF NEW JERSEY

ESSENTIALS OF SYSTEMATIC POMOLOGY

THE WILEY AGRICULTURAL SERIES

EDITED BY

J. G. LIPMAN

Agricultural Marketing.

By JOHN T. HORNER, Professor in Economics, Michigan State College. viii + 249 pages. 6 by 9. 46 figures. Cloth, $2.50 *net.*

Beef Cattle.

Their Feeding and Management. By ROSCOE R. SNAPP, Assistant Professor of Animal Husbandry, University of Illinois. vi + 449 pages. 6 by 9. 85 figures. Cloth, $4.00 *net.*

Essentials of Systematic Pomology.

By BROOKS D. DRAIN, Assistant Professor of Pomology, Massachusetts Agricultural College. vi+284 pages. 6 by 9. 106 figures. Cloth $2.75 *net.*

Soil Management.

By FIRMAN E. BEAR, Professor of Soils, The Ohio State University; Associate in Soils, The Ohio Agricultural Experiment Station. vi + 268 pages. 6 by 9. 33 figures. Cloth, $2.00 *net.*

Principles of Dairying — Testing and Manufacture.

By H. F. JUDKINS, B.S., Head of Department of Dairying, Massachusetts Agricultural College, Amherst, Mass. xvii + 279 pages. 6 by 9. 74 figures. Cloth, $2.00 *net.*

Genetics in Plant and Animal Improvement.

By DONALD FORSHA JONES, Connecticut Agricultural Experiment Station, New Haven. v + 568 pages. 6 by 9. 229 figures. Cloth, $4.00 *net.*

Animal Breeding.

By LAURENCE M. WINTERS, M.S., Professor of Animal Husbandry, University of Saskatchewan. x + 309 pages. 6 by 9. 65 figures. Cloth, $2.75 *net.*

ESSENTIALS OF SYSTEMATIC POMOLOGY

BY

BROOKS D. DRAIN

Assistant Professor of Pomology, Massachusetts Agricultural College

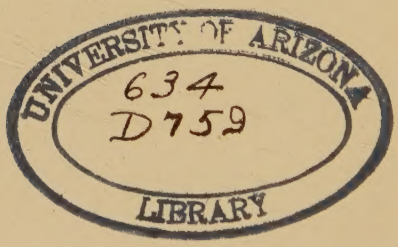
NEW YORK

JOHN WILEY & SONS, INC.

LONDON: CHAPMAN & HALL, LIMITED

1925

COPYRIGHT, 1925,
BY
BROOKS D. DRAIN



Printed in U. S. A.

Stanbope Press
TECHNICAL COMPOSITION COMPANY
F. H. GILSON COMPANY
BOSTON, MASS.

To

PROFESSOR WENDELL PADDOCK

FRIEND, TEACHER, HORTICULTURIST

56788

PREFACE

This book is designed primarily as a text-book in Systematic Pomology. It does not claim to be original in subject matter. Free use has been made of other books, bulletins, and periodicals. The aim is to supplement classroom, laboratory, and reference work.

The author wishes to express his appreciation of the help given him by his many friends. Most of the teachers of Systematic Pomology in North America have helped in one way or another. Direct quotations and borrowed illustrations have been acknowledged throughout the text. The more important indirect quotations can usually be found in the brief list of reference readings. Graphs have been calculated from State (or Province) and National records. The writer is especially indebted to his associates at the Massachusetts Agricultural College, and to Professor Wendell Paddock, who has criticized the manuscript.

BROOKS D. DRAIN.

AMHERST, MASSACHUSETTS,
June 1, 1925.

F16

CONTENTS

CHAPTER		PAGE
I.	Development of Systematic Pomology	1
II.	Fruit Study of Apple Varieties	9
III.	Orchard Studies of Pome Fruits	38
IV.	Fruit Study of Pear Varieties	53
V.	Classification of Pomaceous Fruits	65
VI.	Fruit Study of Plum Varieties	85
VII.	Plant Studies of Plums and Grapes	94
VIII.	Study of Peach Varieties	105
IX.	Study of Cherry Varieties	117
X.	Classification of Drupaceous or Stone Fruits	124
XI.	Fruit Judging and Fruit Shows	138
XII.	Development of Fruit Varieties	155
XIII.	Fruit Study of Grape Varieties	169
XIV.	The Bramble Fruits	182
XV.	Study of Strawberry Varieties	193
XVI.	Currants and Gooseberries	203
XVII.	Blueberries and Cranberries	212
XVIII.	Classification of Small Fruits	220
XIX.	Southern Fruits	230
XX.	Nut Fruits	250
XXI.	Nomenclature of Fruits	264

ESSENTIALS OF SYSTEMATIC POMOLOGY

CHAPTER I

DEVELOPMENT OF SYSTEMATIC POMOLOGY

The study of the varieties and kinds of fruit began far back in prehistoric times. The extent to which fruits were used and studied in past ages seems to have varied with the character of the food supply. Fruit is a perishable product, however, and we cannot expect to find many traces of it among the remains of prehistoric life. One of the earliest records of the use of plants by man is found in the remains of the Swiss lake-dwellings.

Swiss Lake-dwellings. — The period of the Swiss lake-dwellers is generally placed somewhere in the Stone Age. As a race, they made extensive use of plants for food; or perhaps this appears to be so because their habits of living left more records than those of other races. These people understood the art of drying and made extensive use of dried fruits, which were part of their winter food supply. Apples and pears were usually cut lengthwise and dried. In this drying process, some specimens became carbonized. Some remains contain as much as a bushel of these carbonized apples, and, more rarely, carbonized pears. The specimens at the National Museum are of two sorts, one small and the other somewhat larger. Dr. Charles Rau, who donated the specimens here illustrated, labeled them wild and cultivated apples. They are, at least, of two different sorts or types. Early systematic pomology must have started with types or sorts, for propagation must have been either from seed or from suckers. Swiss lake-dwelling remains also contain

Courtesy The National Museum.

FIG. 1. — Dried or partly carbonized apples from the lake-dwellings of Switzerland.

vinifera grape seeds, damson plum seeds, and cherry seeds, as well as cereals.

Earliest Written Records. — Man has probably made use of fruit in the fresh state from the earliest times. The following are brief but suggestive references to very ancient records of its use. The peach is called " Tao " in the book of Confucius, written about 1000 B.C. The fig, olive, and grape were popular fruits in Egypt and in adjoining parts of Asia at the earliest period of which we have written records. We should naturally expect to find interesting accounts of their early use. Piddington's Index lists the Sanskrit name, *Udumvara*, for the fig, while the Great Pyramid of Gizeh is ornamented with fig drawings. Directions for wine making are recorded under the Fourth Egyptian Dynasty, about 2440 B.C., as well as in the Bible. Leaves and branches of the olive (called " Tat ") are found in Egyptian sarcophagi, and we are all acquainted with the story of the dove bringing Noah an olive branch.

Such are the earliest records of the use of fruit and of Systematic Pomology. Legends record many interesting things, but they are hard to interpret with accuracy.

EARLY HISTORIC PERIOD

This period was marked by the development of many varieties and the spread of many kinds of fruit. Grafting was a well-known art among the ancient Greeks and Romans. Theophrastus mentions three kinds of pears and two kinds of apples. Pliny, in his " Natural History," gives a good account of the fruits grown in his time. He lists four kinds (varieties) of quinces, six of peaches, nine of cherries, twelve of plums, twenty-nine of figs, and forty-one of pears. At this time, varieties were named after persons (Claudius apple), places (Camerina apple), qualities (Aromaticall pear), or peculiarities (twin apple, *Gemella*). These names might be compared to our present variety names, such as " Delicious apple " and " Concord grape." By the end of

the classical period, our system of naming fruits, both varieties and kinds, was well established. Variety names must have been badly mixed, however, because when a variety was taken to another country it was usually given a new name. This is a serious obstacle in tracing varieties.

Variety Descriptions. — Early records of the characteristics of varieties are meager and often of uncertain meaning. Thus, Pliny mentions the pear variety " Pomponian, surnamed the Mammosum " (meaning breast-form). This suggests our present-day " pyriform " pear. Some have even suggested that he may have referred to our present-day Bartlett pear, but this is doubtful. At any rate, " Mammosum " and similar terms suggest the beginnings of our modern use of systematic, descriptive terms. Pliny gives the following interesting account of our present dried currant grape of commerce: " As for the Greek grapes of Corinth, they be not in goodness inferior to the Amirean aforesaid. They have a very tender stone within; and the grape itselfe is so small, that unless the soils be exceeding fat and battle, there is no profit in planting and tending such vines."

This account would not ill fit our present-day Corinth or currant grapes. Late in this period, a German pomological writer, named Cordus, published some very good word records of varieties of fruit.

Herbals. — One of the most interesting developments of this period is recorded in a great series of books called herbals. Many of these are in Latin and record innumerable " virtues," or medicinal properties of fruit plants and varieties. Johann Girard's " Of The Histore of Plants " is an herbal which was published as late as 1636 and is quite readable. Many of the " virtues " ascribed to the various plants are amusing, but they indicate a wide study of fruit plants.

Binomial System of Naming. — The binomial system of naming kinds of plants, published by Linnæus in 1753, brought order out of confusion and is in common use to-day.

To illustrate, stone fruits were called *Prunus* by Linnæus, and sour cherries, *Prunus cerasus*. This system was both a grouping and a system of naming, and remains in use to-day in a form remarkably like that devised by Linnæus.

MODERN PERIOD

The other chapters in this book deal with the modern period of Systematic Pomology. We shall stop here only to summarize. Many systems of classification have been devised, but in most cases their usefulness has been limited by the great variation within our varieties and the rapid changes in the variety list. Variety names have been fairly well standardized through the efforts of leading pomologists, the American Pomological Society, and the New York series of monographs on varieties of fruits. These monographs, with their colored illustrations, are a splendid record of our varieties and contain much information about them. Special purposes and conditions have given prominence to (or caused the development of) certain varieties, while they

FIG. 2. — A variety certified tree one year after planting. The glove points to a lead seal on which the variety name is stamped. This work can be done on a large scale at a cost of about one cent per tree.

have allowed others to vanish. Thus, the Loganberry variety of blackberry is now grown in large quantities for its juice. This is but another way of saying that the home planting, with its long variety list, is declining. The business of growing fruit is increasing and is bringing about a very critical sorting of varieties and the exclusive development of the better ones.

Nursery Variety Certification. — Many of the early writers called attention to variety differences in leaves.

Fig. 3. — Oxidase activity in Baldwin apple. The location and amount of dark area indicate enzyme activity.

It is only within the past few years, however, that systematic pomologists have attempted the positive identification of varieties growing in the nursery row as one-year plants. By this method, plants can be identified in the month of August, with as much accuracy as if the fruit itself were present. This practice is rapidly eliminating the misnaming of nursery plants. Anyone can easily learn to identify a few varieties after some careful study.

Chemical and Physical Study of Varieties. — Differences in the chemical composition of some varieties can usually be found. Powers and Chestnut found nearly twice as much flavor in Golden Beauty Crab as in Ben Davis apples. The location and rate of enzyme (oxidase) activity is different for varieties like Baldwin from that of poor-keeping varieties like Astrachan (see illustration). We may anticipate much new knowledge in this field.

FIG. 4. — Oxidase activity in Astrachan apple. This variety is very difficult to store even under good conditions.

Teaching Methods. — Marked changes in methods of teaching Systematic Pomology have occurred during the past few years. Raspberries, blueberries, strawberries, and similar fruits may now be studied at any time in the year, by the use of cold pack specimens. Frozen specimens of these fruits will keep in practically fresh condition and will thaw out while the class is studying them. They still retain most of their natural flavor and taste, as well as appearance. Cold pack is also used in storing vegetable varieties for systematic study. The German method of teaching Systematic Pomology is to require a careful filling

out of descriptive blanks. This has merit, but tends to become mechanical. Modern fruit judging is largely a study of variations within varieties. Such study is really

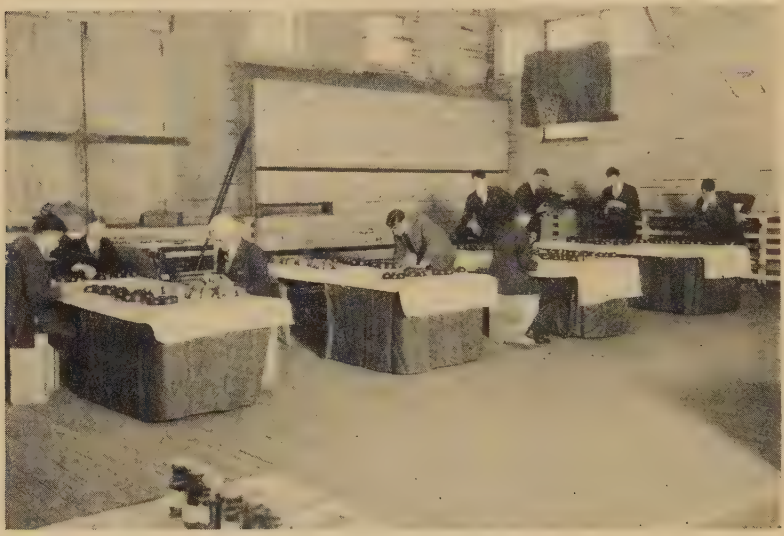


FIG. 5. — New England Intercollegiate Fruit Judging Contest, 1924. Good teaching often involves the use of an immediate incentive. To serve on the Varsity Fruit Judging team is an honor, which inspires intensive study of varieties.

an efficient means of becoming acquainted with varieties, and is reducing the importance of descriptive blanks in variety fruit study.

CHAPTER II

FRUIT STUDY OF APPLE VARIETIES

Experienced fruit growers may often be mistaken in naming a variety of apples from a single specimen. Beginning students must be very critical in fruit variety studies, if they are to become efficient in naming varieties. One of the author's favorite class exercises is to take as many variations as can be found of the variety Baldwin and put them in a basket with one or two specimens of another red

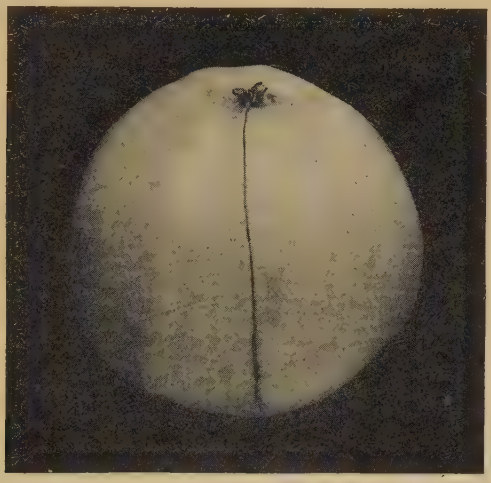


Fig. 6. — An apple suture (variety Winter Banana). What is the relation of suture to carpel cells in apples? How do you explain the formation of sutures in pome fruits? The suture in apples, usually, does not extend into the flesh.

variety of apples. Some students will divide the Baldwins into six or eight varieties. In the author's experience, no beginning student has named all of the apples correctly. One needs to study many specimens of a given variety to find out differences that are more or less constant.

It is a good plan to start by making one's own variety studies, noting the more obvious differences between a few varieties.

Size. — Size is often the first thing noted. One is not likely to take a Wolf River apple for a Wagener. Size is a character that is subject to great variation, however. A heavily loaded tree usually has smaller fruit than a young tree with but a few specimens. In addition, size is of considerable importance from a market standpoint. Thus, a restaurant proprietor desiring fruit for his window displays wants large, attractive specimens, while many children prefer a whole small apple to half a large one.

If we compare several varieties of apples, as represented by a bushel of tree-run fruit of each variety, we are likely to notice that one lot is nearly all of one size, while another lot varies. Thus, Wealthy produces fruit that is quite uniform for any given tree, while Winter Banana has small and large apples on the same branch. Uniformity in size is of considerable commercial importance, since lack of uniformity increases the cost of grading.

Shape. — Many students on judging teams consider shape, or form, one of the most constant characters. McIntosh is nearly round. Cortland is somewhat more flat or oblate. York Imperial is usually lop-sided or oblique. In addition, York Imperial is flat at both ends (truncate). Winesap is practically always larger at the stem end than at the blossom end (conical). Williams is a long, or oblong, apple. If the length through the core exceeds the width, the fruit is oblong; if the length is less than the width, the fruit is considered oblate. Cross sections of varieties of apples differ decidedly. Take a number of varieties and compare them. Some are very regular, as Northwestern Greening and Winesap; others are irregular. Wagener and Rhode Island (Greening) are good examples of apples that are irregular in cross section. Some varieties are markedly elliptical in cross section. The Roxbury (Russet) can usually be distinguished from Golden Russet because of its

elliptical form in cross section. Many varieties are more or less pentagonal in shape. Note that the corners of the pentagon bear a certain relation to the location of the seeds in the fruit. Select a number of specimens of Baldwin that vary in form. One group will probably be oblong, another round, while a third will be quite oblate. This indicates lack of uniformity in shape. Dr. Shaw showed that a cool climate, a high humidity, and the fact that the apple grew on the north side of the tree had a tendency to cause the formation of an oblong specimen.

Color. — To one who is just beginning to study varieties, color appears to be the most important character. Perhaps it is the most important from a market standpoint. However, color varies so much between sections, and even in the same orchard or on the same tree, that it is not a very good character to depend upon in identifying varieties. Most varieties have two kinds of color, the over-color or outer color, and the underlay or under-color. The latter will change in storage, usually starting with some shade of green and changing to some shade of yellow. Southern-grown specimens develop a deeper shade of yellow than those grown in the North. The outer color does not change much in storage and is usually some shade of red or russet. The amount of color varies greatly, but the shade is fairly constant for a given variety. The way the color is developed on the apple is quite characteristic of varieties. The red of the Maiden Blush is usually spread evenly, or blushed; that of the King, stippled; the Wealthy is striped or sometimes splashed; and the Stayman, mottled. There are two substances that modify the color of apples, namely, scarf skin and bloom. The latter is an oily or waxy coating on the skin of most varieties of apples. The fruit stand dealer often removes much of the bloom by " shining," a practice which is thought to reduce the keeping quality of apples. Restaurant managers sometimes increase the amount of greasy bloom by applying a small quantity of butter. Scarf skin, on the other hand, cannot be easily removed by

rubbing. It seems to be a grayish pigment which lies over the red or outer color. The presence of this pigment, which is more plentiful near the stem end of the apple, often causes a lavender effect. McIntosh has a large amount of bloom. Wagener and Fallawater usually have a large amount of scarf skin.

Skin. — The character of the skin of all fruits is quite important, as it affects their shipping and handling qualities. Cortland has a somewhat tougher and thicker skin than McIntosh. Blue Pearmain is usually rough, while Rome has a smooth, shiny skin. This character may vary somewhat with the section. Thus, Golden Delicious, as found by the author in the fruit shows of New England, has a more or less rough skin, but Missouri-grown specimens of the same variety usually have a smooth skin.

Dots. — Dots have long been considered the breathing pores of fruit, much like the stomata of the leaves and the lenticels of the bark. At least some of the gas exchange, however, takes place through the core of most varieties of apples. The dots, which are small, more or less numerous structures in the skin of apples, and of most other kinds of fruit, are very useful in identifying varieties. Jonathan usually has few dots, while Baldwin has many. The dots of Baldwin are sunken, those of King usually raised, and those of Winter Banana submerged. Many varieties of the Winesap group of apples have a light area around the dot; such dots are said to be areolar. Jonathan has a very small, inconspicuous dot, while Fallawater has a large one. Dots are usually less numerous toward the stem end of most varieties of apples. Some pomologists even try to assign color and shape to dots, but it will be better for the student to start with the more obvious characters.

Stem. — The stem of the apple is important in several ways. If long, it often punctures the skin of the apple to which it belongs or that of an adjoining specimen in the same package. If short, it may slow up the operation of picking the fruit. A stemless specimen is usually considered second-

grade in sorting apples. This is due to the fact that decay is likely to begin at the point where the stem was removed. The stem is used to help identification in variety study. Rome and Delicious have long stems. Sutton has a very slender stem. Wolf River has a short, thick stem. Williams often has a small amount of flesh about the base of the stem. The stems of apple varieties may vary. By examining blossom clusters, we find that side blossoms in the blossom cluster usually develop longer-stemmed specimens than the terminal blossom, although this is not always true.

Cavity. — The depression at the stem end of apples, and of many other kinds of fruit, is called the cavity. Apple cavities may be shallow, as in Rome, or deep, as in Jonathan. Spy has a wide cavity, while that of Wagener is narrower. The cavity of Ben Davis is usually marked with russet, while that of Rome is green.

Basin. — The depression in the end opposite the cavity is called the basin. It varies in much the same way as the cavity. Thus, McIntosh has a shallow basin; that of Jonathan slopes more abruptly. The basin of Winesap usually has small wrinkles and is called wavy; that of Delicious is more deeply wrinkled and is called ridged. These are the more obvious differences between cavities and basins of apples. As we work with varieties, we shall notice still others.

Calyx. — In the basin of the apple, we find the calyx, which consists of the more or less dried-up remains of the apple blossom. In Winesap and Roxbury, the calyx parts or segments have grown closely together, while in Yellow Newtown and Grimes the five segments are widely separated. We speak of the former as closed, and of the latter as open. Stark has a very large calyx; Yellow Bellflower has a much smaller one. These segments may come together, or converge; in other cases they turn away from each other, or diverge. Quite often they start to come together and then turn away; they are then called reflex. The calyx is of

some value in distinguishing varieties. The lobes or segments of the calyx bear a certain relation to the seeds in an apple. It is always possible to split a carpel, or seed cell, by cutting between two calyx lobes.

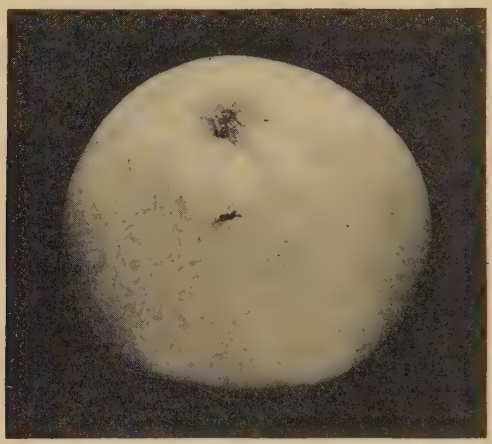


Fig. 7. — A small dried-up leaf that grew on the side of an apple. How do you explain the occurrence of such leaves?

INTERNAL CHARACTERS OF APPLES

On cutting an apple through the core, we find a number of different parts. There is the core, containing five seed cavities, or carpels. Below the calyx, there is a small cavity, or passage, which usually acts as an air passage. We notice that there are two kinds of flesh: the central or core flesh, which may have originated from the pith; and the outer flesh, which is usually thought to have originated from the receptacle. The fact that small leaves are often found growing from apples indicates that the fruit really originated in part from a shoot. The line dividing the two kinds of flesh is called the core line. Apples of the Baldwin, and many other varieties, when they have been too long in storage, often have nearly all the core flesh brown and dead. It is believed that the core flesh deteriorates first because enzyme activity is greater in that part of the apple than elsewhere.

Calyx Tube and Stamens. — Let us see how these internal structures or parts compare in a number of varieties. The passage directly under the calyx is called the calyx tube. In Delicious, we find it long, often extending into the core. If a number of specimens of this variety are examined, some will usually be found to have a moldy core. This is because the calyx tube has permitted mycelium to enter the core cavities. In Rome, this tube is short and usually

FIG. 8. — Longitudinal section of Delicious apple. Note the unusually long calyx tube. Such a tube is often accompanied by moldy carpel cells, as in this case. This specimen illustrates: distant core, clasping core lines (note bundle of fibro-vascular bundles leading to calyx segments not considered in descriptions), abaxile core, mucronate and open carpel cells.

shaped like a funnel. In Grimes, the calyx tube is broad, and conical in shape. The more or less dried-up projections on the sides, base, or margin of the tube are what is left of the stamens of the apple blossom. Usually, the pistils show as a single bundle. In Grimes, the stamens are at the base of the tube (basal); in Esopus Spitzenburg, they are about half-way (median); and in some varieties, they are near the outer edge (marginal). These remains of the

apple blossom will help us to understand how the fruit developed or grew.

Core. — We have all heard the story about the little boy who said his apple would not have any core. Some day, we may be wise enough to grow apples like that. Up to the present time, the author has seen but one or two coreless apples. Some of our newer varieties have very small cores. Golden Delicious and Stayman are good examples of small-cored varieties. Yellow Bellflower has a very large core. Some growers prefer small-cored varieties because there is less waste in cooking them.

When a McIntosh apple is shaken the seeds may be heard to rattle. They do so because the seed cells, or carpels, open into a space in the center of the apple. The McIntosh has an abaxile core; that is to say, the flesh does not come up to the axis of the core. Only a few varieties are axile. Lady is a good example of a variety having an axile core. Form of core and distance from the base of the stem have some value in identifying varieties. Extending from the base of the stem to the calyx tube, are ten large vascular bundles. These bundles supply the torus flesh and mark the boundary of the core. They are called core lines.

Carpels. — In and about the core, are five chambers containing seeds. These are called cells, and their walls are called carpels. The cells may be open or closed, as described under "Core," above. As a rule, a small-cored variety has a small cell; thus, Stayman has a small cell, and Yellow Bellflower a large cell. The cell walls, or carpels, are sometimes split. In some cases, in addition to being split, they are tufted with a whitish, cellulose material. Not infrequently, we find the seeds also tufted.

Seeds. — From a commercial point of view, the presence of many viable seeds indicates freedom from pollination troubles. We often find that the small sides of apples contain fewer viable seeds than the larger sides. For this reason, it is desirable to note the number of seeds. In some varieties, the color and shape of the seeds are distinctive.

Thus, Yellow Bellflower has long slender seeds, and those of Grimes are shorter. Degree of maturity will cause the color of apple seeds to vary. A dark color of seeds has long been used as an indication of hard ripe or picking time.

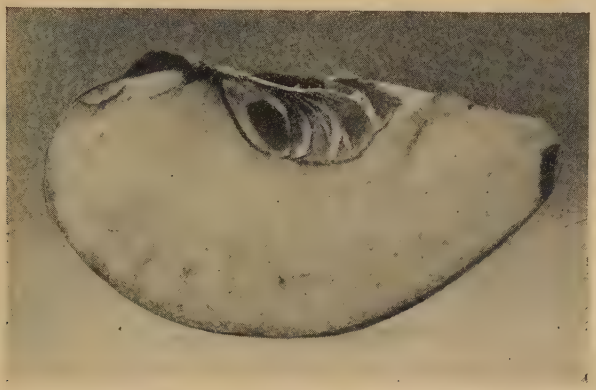


FIG. 9. — A section of Yellow Bellflower apple showing tufted carpel cell. This cottony-like material gives a test for cellulose. Apple seeds are sometimes tufted.

Flesh. — The color of the flesh is often very striking. The flesh of Canada Baldwin and Wealthy is often pinkish and streaked with red. Arkansas Black has a very yellow flesh, while Fameuse and McIntosh have white flesh. Most varieties have some shade of yellow. Next to color, the amount of juice is the most variable flesh character in apple varieties. We look upon Ben Davis as a dry-fleshed variety and McIntosh as a very juicy one. Some varieties become mealy, because of a change in composition of the middle lamellæ of the cell walls. This middle cell wall is composed of pectic material, which is at first insoluble but becomes soluble in many varieties as they become overripe. Black Gilliflower becomes mealy very quickly. Delicious is considered a crisp-fleshed variety. Lawver is noted for its firm flesh. Liveland is quite the opposite of Lawver in this respect.

Flavor. — Many varieties of apples have very distinctive flavor, but we find difficulty in expressing this in our notes.

The author's students often find trouble in telling sweet apples from sour or acid varieties. This is partly because all apples lose acidity in storage. Most persons prefer a subacid apple, i.e., one that is neither sweet nor acid. Many apples have more or less aroma, McIntosh, for example, being quite aromatic. Aroma is really an odor, not a taste. The student can test his ability to recognize flavors by taking ten or twelve varieties that range from flat to aromatic and from sweet to acid, peeling them, and placing slices of the different varieties on numbered plates. Few will be able to name the varieties, although color of flesh may help. In the writer's experience, Ben Davis has been called McIntosh, and *vice versa*, in such tests.

Quality. — After carrying out many of these tasting tests, the writer is really at a loss how to define quality. Presumably, it is the sum total of all those characters which make a given variety desirable to eat. In addition, we have to consider cooking quality, jelly-making quality, cider-making quality, keeping quality, etc. It is usually found best to grade the varieties as very good, good, medium, poor, and very poor for any given quality, and to use dates for keeping quality. Thus, Ben Davis is very poor in dessert quality, very good in shipping quality, about medium for culinary use, and makes a good grade of cider.

A quality-judging exercise will be found quite interesting in the study of any food product. Such an exercise requires the use of several specimens of ten or twelve varieties, preferably those of which the group has not previously formed an opinion as to quality. The students are required to grade the varieties as to dessert quality, noting objectionable and desirable characters. The conclusions of the class are then summarized and compared with the conclusions of the instructor. Care should be taken to prevent the taste of one variety being carried over to another. A variation of this exercise is to compare specimens of the same variety from different parts of the country.

Summary. — Our apple variety study would not be complete if we did not summarize or draw conclusions for each variety. Outstanding weaknesses, like the susceptibility to scab of McIntosh, the biennial bearing of Baldwin, the

Pomology Department
Mass. Agri'l. College
Amherst, Mass.
October 11, 1923

Mrs. A. J.Steere
Southbridge, Mass.

Dear Madam:

Your package addressed to the Massachusetts Agricultural College has been referred to me for identification. In my opinion the pears are Seckel.

Respectfully

James A. Elliott

Dear Madam:

Your inquiry and specimens have been referred to the above student. I have inspected his work and find it correct.

Sincerely yours

Brooks D. Drain

Brooks D. Drain
Ass't. Professor of Pomology

FIG. 10. — Identification of specimens sent in by growers adds interest to variety study, especially if the student's letter is mailed to the grower.

mealiness of Chenango, or the shy bearing of Arkansas, should be noted. It is also of some importance to consider the commercial standing of varieties, to what extent they are grown, and their popularity in the market. The author's students often make maps showing where varieties are grown.

Apple Descriptions. — Experiment Station workers and nurserymen often have occasion to make an accurate word record of the characteristics of some apple variety. Waugh and Shaw give very good examples of the descriptive blanks used for this purpose. The student may test the accuracy of his previous work by trying to fill out a few of these blanks.

Identification Contests. — In addition to writing fruit descriptions, it is good practice to make up a basket containing one or two specimens of each of the varieties studied, and then try to name the varieties. This can be made a contest in order to add interest to the work. Another variation is to have students answer letters accompanying specimens to be identified. The author has often done this, mailing the student's letter with a note stating that he has inspected the student's work.

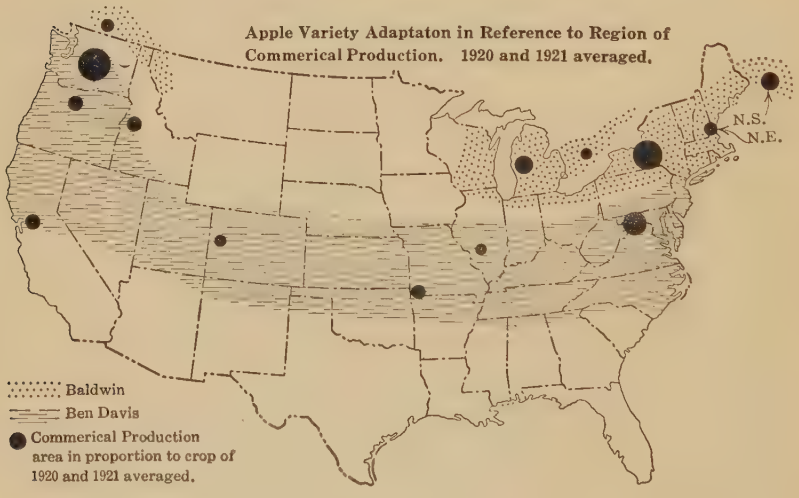


Fig. 11.

Variety Adaptation. — As a rule, apple varieties that thrive in the northern part of the United States and Canada are not grown to any extent in apple sections farther south. The accompanying outline maps will make this clearer for

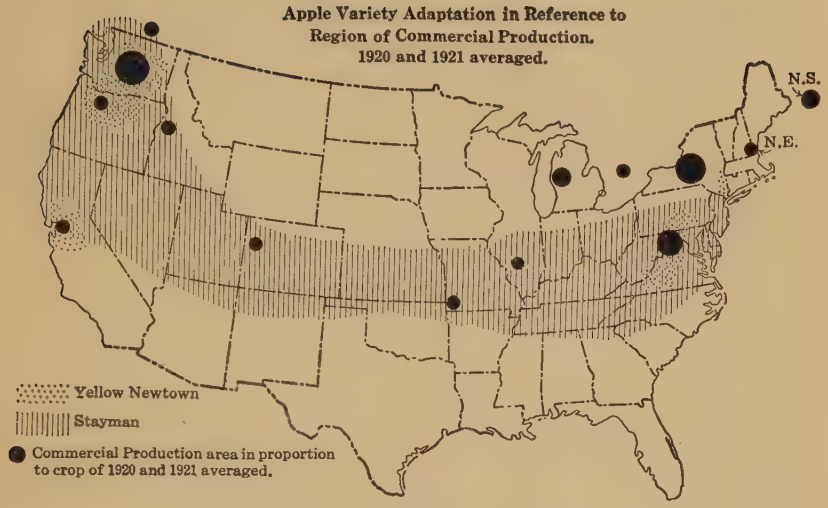

Apple Variety Adaptation in Reference to
Region of Commercial Production.
1920 and 1921 averaged.
N.S.
N.E.
Yellow Newtown
Stayman
Commercial Production area in proportion
to crop of 1920 and 1921 averaged.

FIG. 12.

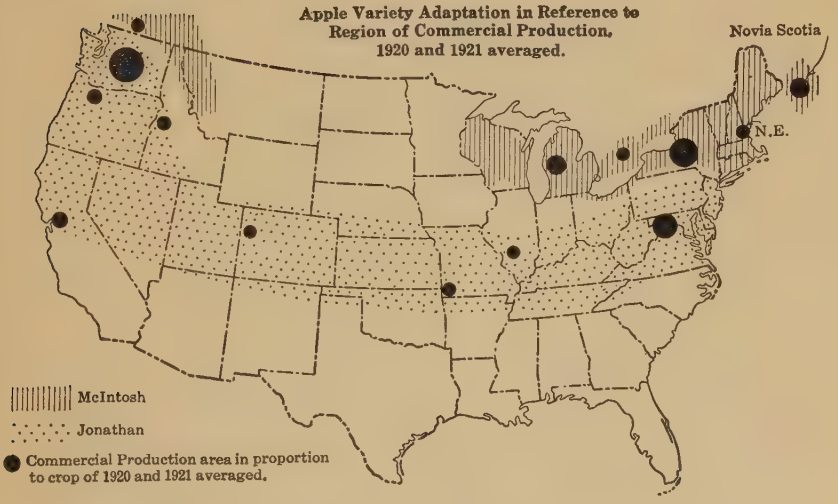

Apple Variety Adaptation in Reference to
Region of Commercial Production.
1920 and 1921 averaged.
Novia Scotia
N.E.
McIntosh
Jonathan
Commercial Production area in proportion
to crop of 1920 and 1921 averaged.

FIG. 13.

a few of our prominent varieties. A winter variety in the North becomes a fall variety in the South. A winter variety in the South fails to mature properly if grown too far north. When grown toward its southern limit, a variety is likely to be more oblate than usual, to develop more yellow and less red in its coloring, as well as to deteriorate somewhat in keeping quality. The areas indicated on the maps show adaptation only in a general way. Thus, Ben Davis has been grown with profit in Maine, although it is hardly adapted to that section.

Score Card in Selecting Varieties. — Adaptation is only one factor in selecting varieties for planting. Even after many ill-adapted varieties have been discarded, there will still be quite an array from which to choose. The accompanying graphic score card is a modification of one made by Professor F. C. Sears.[1] The chief value of any score card is to furnish a basis for comparison. Selection should be made by comparison rather than by actually filling out a score card for each variety. To illustrate further, one should consider such questions as the following: "Why grow Hubbardston or Washington Royal (Palmer Greening) in Massachusetts when you can make more money growing Baldwin and McIntosh." All four of these varieties will score high on the above score card, but all are not equally profitable under given conditions.

Select Few Varieties. — Every year, most markets are cluttered up with varieties that the public does not care to buy. One commission merchant remarked that he could sell Wolf River apples if he had enough customers. It takes quite a number of varieties to fit all sections, but commercially a few really superior varieties are better. Fruit growers in eastern North America are noted offenders in this respect. There are really no valid reasons for planting more than one superior variety for a given season in a given section. It is difficult to sell other varieties during McIntosh season in New England. This is not as true of Baldwin, for

[1] Sears, Fred C., "Productive Orcharding," p. 24, 1914.

its season is somewhat longer. Jonathan has few equals as a dessert apple during early winter, and many of its competitors sell at a discount. Winesap is a leader among the best keepers. Five varieties of high quality, good color, and heavy production are enough for any ordinary grower;

Apple Variety Score Card
(General market)

Tree Characters..... 40

10% Early bearing. | 20% Regular and heavy bearing. | 10% Vigor and health.

Fruit characters..... 60%

8% Size. | 12% Dessert and culinary quality. | 20% Color and appearance. | 10% Keeping quality. | 10% Handling quality.

Fig. 14.

three varieties will often be more profitable. This number should provide for cross-pollination, distribute the harvesting and marketing period, supply the market, and utilize several kinds of soils. Diversification can often be secured to advantage by growing two or three kinds of fruit rather than more varieties of one kind.

Recommendations for Various Sections. — Variety selection is a local problem, and must be determined for each section. One of the most difficult problems that confront the fruit grower is that of deciding just what varieties to plant. He can consult various authorities, find out what has been planted, and, from sales of nursery stock, determine what is being planted. The following list was drawn up after consulting all three sources of information, including a report by Professor C. P. Close.[2]

New England and much of New York

Baldwin
McIntosh
Wealthy

Pennsylvania, Maryland, West Virginia and Ohio

Stayman (Winesap)
Delicious
Jonathan

Virginia, New Jersey and Delaware

Winesap
Stayman (Winesap)
Jonathan

Kentucky, Tennessee, South Carolina and North Carolina

Delicious
Winesap
Stayman (Winesap)

Illinois, Southern Michigan and Indiana

Jonathan
Grimes

Kansas, Arkansas, Oklahoma and Missouri

Winesap
Jonathan

[2] Close, C. P., "Commercial Varieties of Apples for the Apple Producing Districts of United States," Report of American Pomological Society, 1924.

Northern Iowa, Wisconsin and Minnesota
Wealthy
Northwestern Greening
McIntosh (in Wisconsin and parts of Minnesota)

Southern Iowa and Nebraska
Jonathan
Grimes

Utah, Colorado and New Mexico
Jonathan
Rome (Beauty) (high altitudes of New Mexico)

Washington, Oregon and Idaho
Winesap
Delicious

Ontario, Canada
McIntosh
Wealthy
Oldenburg

British Columbia
McIntosh
Delicious

This list shows remarkable similarity in general recommendations or first-choice varieties. Only eleven varieties have been included, and no consideration has been given to summer and early fall varieties.

Testing New Varieties. — Someone should test new varieties in every section. Varieties are constantly being discarded as better ones are found, and hundreds of new varieties fail to make good. The commercial grower can scarcely afford to plant more than one tree of a new and untried variety. Several varieties may even be grafted on a single tree, although this is hardly a fair test. Even after trial, new varieties should be planted with care. It is best to be certain, before changing, that the new variety is really superior to the established ones.

SOME APPLE VARIETY NOTES

Good Points *Bad Points*

Arkansas Black

Origin: Benton County, Arkansas.

Splendid keeper.
Attractive.
Grows well on poor soil.
Sells well.
Good shipper and handler.

Shy producer.
Pollination troubles.
Not adapted to North.

It does fairly well in some of our southern apple sections.

Fig. 15. — A water cored King apple. This is a failing of Yellow Transparent, King, and in a slightly different form Delicious varieties.

Arkansas — Paragon — M. B. T.

Origin: See "Apples of New York."

Resembles Baldwin — Good color.
Good keeper.
Good quality (in South).
Vigorous and large tree.

Shy bearer — pollination.
Not hardy.

Grown to some extent from Maryland to Washington. Includes two varieties that closely resemble each other.

Good Points	*Bad Points*

BALDWIN

Origin: Massachusetts.

Heavy cropper.	A biennial cropper.
Handles and keeps well.	Subject to Baldwin spot.
Average in quality.	Many trees killed or injured by cold.

A standard commercial variety in our northern fruit sections.

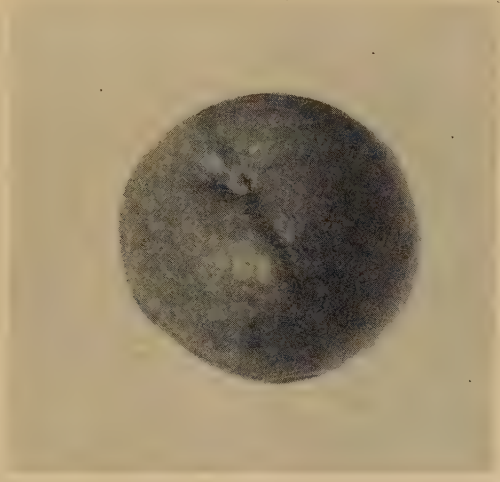


FIG. 16. — A "Baldwin spotted" (sunken areas) specimen of Baldwin. This is quite a failing of this old and justly popular variety.

BEN DAVIS

Origin: Unknown.

Heavy and annual cropper.	Poor quality.
Attractive looking fruit.	Fruit easily russetted by spray.
Late in blooming.	
Late keeper.	
Ships and handles well.	

Formerly a leading commercial variety for the wholesale trade. Black Ben Davis and Gano are quite similar, but redder in color. Should not be planted in our northern sections. Sells at a discount. Ben Davis is being replaced by better varieties.

Good Points	*Bad Points*

Canada Baldwin

Origin: Quebec.

Fairly attractive.	Only fair quality.
Very hardy.	Moderate producer.
Annual bearer.	Below medium in size.
Good keeper.	Poor culinary fruit.

Little grown in United States.

Cortland

Origin: Geneva, New York. A cross between Ben Davis and McIntosh.

Heavy cropper.	Subject to scab.
Handles better than McIntosh.	Comparatively untried and unknown.
Keeps better than McIntosh.	
Preferred by some to McIntosh because less spicy.	

A new and promising variety to follow McIntosh in season of marketing.

Delicious

Origin: On farm of Jessie Hiatt, Peru, Iowa.

"Trade-mark" shape.	Poor keeper — variable.
Firm flesh.	Runs small on old trees.
High quality.	Scabs badly.
Very good shipper.	A box apple.
Runs high in fancy grade.	Not a culinary apple — too mild-flavored.
Very productive.	
Annual bearer.	
Early bearer.	

A favorite dessert apple and is doing well in many of our apple sections.

Esopus (Spitzenburg)

Origin: Esopus, New York.

High in quality for dessert, cooking and canning.	Only a moderate cropper.
Popular and sells well, a fancy fruit.	Cost of production per bushel often runs high.
Handles well.	Quite susceptible to fungous diseases.
Attractive fruit.	Needs a fertile soil.

This variety is grown commercially in the Pacific Northwest and is limited to home planting in most sections of eastern North America.

Good Points	*Bad Points*

FALLAWATER

Origin: Pennsylvania.

Large.	Only fair quality.
Fair culinary apple.	Not attractive.
Production good.	Coarse.
	Often poorly colored.

Fallawater is little planted even in home plantings, although widely distributed in older plantings.

GRAVENSTEIN

Origin: Doubtful — Holland. Supposed to have a similar origin to Oldenburg and Astrachan. (German or Russian.)

Good grower.	Winter killing, result — short lived.
Good habits of growth.	Drops badly.
Good season.	Ripens unevenly.
Good producer.	

Popular in New England, Nova Scotia and certain parts of Canada. Some growers prefer one of the red strains of this variety.

GOLDEN DELICIOUS

Origin: West Virginia.

High quality — resembles Grimes.	Comparatively untried in many sections.
Bears young and very heavily.	A yellow apple.
Widely advertised.	Overloaded trees tend to run small.

Looks promising for about the same sections as for Grimes. New England-grown specimens are often small and appear immature.

GRIMES (GOLDEN)

Origin: West Virginia.

Standard dessert quality and very good culinary quality.	Tree collar rots.
Handles well for a yellow apple.	A yellow apple.
A good producer.	Not a good keeper.

Adapted to our apple sections from Maryland to Oregon. Especially prized in home plantings and for local markets.

When grown in our northern apple sections, it is apt to run small and lacks flavor.

Good Points	*Bad Points*

JONATHAN

Origin: On farm of Philip Rick, Ulster County, New York.

High quality — especially dessert.	Fire blight.
Good grower — rich soil.	Jonathan spot.
Hardy.	Keeps only to midwinter.
Handles well.	Requires rich soil.
Adapted to South.	Small and irregular in North.
Good producer.	Medium-sized trees.
Bruise dry.	

A splendid dessert apple for fall and early winter. Adapted to nearly the same sections as Winesap.

KING DAVID

Origin: Claimed to have been introduced from Ozark region by Stark Brothers. (About 1905.)

Very high color.	Hard to tell when to pick.
Bears early.	Variable keeper.
Bears heavily.	Mealy when overripe.
Very vigorous grower.	Water cores under some conditions.
Healthy.	Subject to Brooks spot.
Hangs well.	New (relatively).
A possible filler tree.	

This variety is much prized for jelly making. It should be planted with care.

MCINTOSH

Origin: Ontario, Canada. On the farm of Mr. McIntosh.

Annual and heavy cropper.	Must be handled very carefully.
High dessert and culinary quality.	Very subject to scab.
Attractive color.	Loses flavor in storage.
Very hardy to cold.	Tendency to drop.
Often sells at a premium.	

A splendid local variety for our northern apple sections. Should be marketed by early winter.

Good Points	*Bad Points*

NORTHWESTERN GREENING

Origin: Wisconsin.

Very hardy to cold.	Only "good" for both culinary and dessert uses.
Reliable biennial bearer.	
Productive.	Crop variable in size.
Holds shape in baking.	Green color, not attractive.
Handles well for a green apple.	

Popular with some growers where hardiness is an important factor.

OLDENBURG (DUCHESS OF)

Origin: Russia.

Heavy producer when young.	Tender to heat.
High in culinary quality.	Production decreases as trees become old.
Very hardy to cold.	
Handles well.	Not desirable for dessert purposes.

Often planted as a " filler " variety, and as such is usually profitable. Ripens in early fall.

OPALESCENT

Origin: Xenia, Ohio. Introduced 1899.

Attractive.	Poor quality.
Good bearer.	Little known.
Bears early.	New.
Good grower — (vigorous).	A culinary variety.
Good shipper.	Only moderate keeper.
Hardy.	
Relatively free from scab.	

This variety looks well in a window display, but has little to commend it. A variety for wholesale trade.

RED ASTRACHAN

Origin: Supposed to be a Russian apple imported from Sweden to England and thence to United States.

	Many synonyms.
Attractive color.	Ripens unevenly.
Cooks well before fully ripe.	Very perishable.
Fair size.	Biennial cropper and unreliable.
Good dessert apple if fully ripe.	Very variable in size.
Bears young.	Large per cent culls.
Good tree characters.	More of a home variety.

A favorite early-ripening red apple. Grown in home plantings and for local markets.

Good Points	*Bad Points*

RHODE ISLAND (GREENING)

Origin: Rhode Island.

High culinary quality and at least good dessert quality.	An uncolored apple.
Usually good cropper.	Often scalds badly.
Widely adapted to soil.	Often troubled by scab and fungous diseases.
Well-known.	

About third in importance among commercial apples in New York. Desirable in home plantings over much of northeastern United States.

ROME (BEAUTY)

Origin: Ohio.

Large, attractive fruit.	Not high in quality.
Heavy producer.	Poor tree in nursery.
Late bloomer.	Tends to become mealy if stored too long.
Handles well.	
Good keeper.	

A well-known commercial variety in southern Ohio and similar apple sections. In New England and similar sections, the fruit is poorly colored and tends to run small. Some growers prefer varieties of better quality.

ROXBURY

Origin: Supposed to be Roxbury, Massachusetts.

Long keeper, especially in common storage.	Only a moderate cropper.
High culinary quality.	Biennial bearer.
A good export apple.	Russetted.
Healthy.	Requires rich soil.
Well-known.	
Handles well.	

Little planted in commercial orchards. Once a prominent variety; now popular in home plantings.

Good Points	*Bad Points*

SPY (NORTHERN)

Origin: New York.

High quality, both dessert and culinary.	Comes into bearing late.
Blossoms late.	Susceptible to scab.
Annual, light crops.	Needs handling with care.
Well-known.	Variable keeper.

Not being planted as much as formerly. Adapted to the northern sections. Red Spy is a better-colored strain.

WAGENER

Origin: Penn Yan, New York.

Bears very young and heavily.	Production decreases as trees become old.
At least "good" in quality, both dessert and culinary.	Susceptible to apple scald.
Keeps well until about January.	Fruit variable in size and shape.

A splendid " filler " variety that will keep longer than many varieties used for this purpose. Often sold for Spy.

WEALTHY

Origin: Minnesota, by Peter Gideon. Claimed to contain a strain of crab-apple.

Bears very young and heavily.	Production tends to decrease with age unless heavily fertilized.
At least "good" in quality.	Overbears.
Very hardy to cold.	Susceptible to cedar rust.
Attractive fruit.	

A splendid " filler " variety, and usually profitable. Also desirable in a home planting.

WILLIAMS

Origin: Roxbury, Massachusetts.

Synonyms: Queen, Lady's apple.

Very attractive color.	Handles poorly.
Very good dessert apple for the season.	Requires several pickings.
Claimed to bear young.	Unreliable cropper.
Cooks fairly well.	Fruit runs small on old trees.
Often sells well locally.	

A good summer apple following Red Astrachan.

Good Points	*Bad Points*

Winesap

Origin: Unknown.

Remarkable keeper.	Too small.
A late dessert apple.	Pollination troubles.
Attractive.	Not adapted to North.
Bears early.	Not hardy.
Bears regularly.	Tough skin.

A well-known commercial variety from Virginia to Oregon. It should not be planted in our northern apple sections.

Winter Banana

Origin: Indiana.

Bears young and heavily.	Not a red apple.
An attractive shade of yellow, with a bright blush.	Not liked by some people.
Keeps well.	Lacks uniformity among specimens on the tree.
	Low grades sell poorly.
	Becomes mealy if stored too long.

Sometimes desirable for local markets. Grown to some extent commercially.

Yellow Newtown

Origin: Newtown, Long Island.

Very good dessert quality.	Fickle as to soil and location.
Ships and handles well.	Odd shape.
Keeps well.	Susceptible to scab.
Standard export variety.	Needs a fertile soil.

Grown commercially in Hudson Valley, Virginia and Pacific Coast section.

Yellow Transparent

Origin: Russia.

Heavy and annual cropper.	A yellow apple.
Starts bearing early.	Tends to run small.
Immature fruit of some value for cooking.	Perishable and hard to handle.
Very early variety.	Subject to fire blight.

Popular for home use and local markets.

NOTES ON CRAB-APPLE VARIETIES

Good Points *Bad Points*

Hyslop

Origin: Unknown.

Good color and attractive.
Good producer.
Good tree characters.
Good keeper.

Fig. 17. — Martha Crab-apple cracked while in storage. This is a striking characteristic of many varieties of crab apples when stored under humid conditions. This seems to be similar to the cracking of grapes and other fruits following a rain at ripening time.

Martha

Origin: By Peter Gideon of Excelsior, Minnesota.

An early and good bearer. Light, although attractive color.
Good-sized fruit.
High culinary quality.

Transcendent

Origin: Unknown.

Good-sized, high-colored fruit. Poor keeper.
Good producer.
High culinary quality.

Transcendent and Hyslop are leading varieties in many parts of eastern United States.

COMPLETION EXERCISES FOR REVIEW

In the blank spaces in each of the following sentences, write words that will make a complete and correct statement. Check your insertions by reference to the text and to the actual fruit if available.

1. Baldwin can be distinguished from King by ..... and ..... Baldwins usually have ..... and Kings have .....

2. ..... and ..... illustrate varieties that tend to produce annual crops.

3. Other things equal, ..., ..., and ..... are three of our heaviest producing varieties of apples.

4. ..... and ..... are large-fruited varieties of apples; ..... and ..... tend to run small in size.

5. ..... and ..... are two of our smallest-cored varieties of apples.

6. ..... and ..... are varieties that are very subject to apple scald.

7. When in prime condition, ... apples often sell at a premium over other varieties.

8. ....., ..., and ..... are among our most hardy varieties of apples to low temperatures.

9. ..... and ..... blossom very late, which is an advantage where late spring frosts are common.

10. Apple scab is especially bad on ....., ..., and ..... varieties of apples.

11. McIntosh and Spy have the ..... of handling .....

12. Jonathan and Winesap can be distinguished by .....; Jonathan has ..... and Winesap has .....

13. McIntosh has a large amount of ..... bloom.

14. Jonathan ranks ..... in dessert quality and will keep to about ..... in cold storage.

15. Fameuse and Cortland have .....colored flesh.

16. The Williams apple is ..... in shape.

17. Delicious and Rome are noted for having ..... stems.

18. Baldwin tends to start bearing ..... and Golden Delicious .....

19. ..... and ..... are firm-fleshed varieties, while ..... is more soft-fleshed.

20. ..... will lose flavor rapidly in storage.

REFERENCE READINGS

Beach, S. A., "The Apples of New York," Volumes I and II, 1903.

Shaw, J. K., "The Technical Description of Apples," Massachusetts Agricultural Experiment Station, Bulletin 159, 1914.

Waugh, F. A., "Systematic Pomology," pages 34 to 55, 1903.

CHAPTER III

ORCHARD STUDIES OF POME FRUITS

The fallacy of judging apple varieties from fruit alone was illustrated in a certain New England orchard. The owner, a city friend, purchased six or eight samples of

FIG. 18. — Variety Wagener apple. Early coming into bearing, heavy production, and upright habits of growth make this variety desirable in some sections as a "filler."

about forty varieties. Then he and his family tasted and examined the specimens, and selected the varieties they wished to plant. When the orchard came into bearing, some varieties made a large growth and others a scant growth; while certain varieties produced twice as many baskets of fruit as others. From the point of view of the

fruit grower, tree or plant characters are frequently of as much importance as fruit characters.

Growth Habits. — Let us start by comparing some apple varieties as we find them growing in the orchard. We shall need to be careful to find trees that are of the same age, that grow in similar locations, and that have been treated in the same way. The first difference usually noted is size. Rhode Island Greening is a very large tree; Wealthy is usually small. In addition, the branches of Rhode Island Greening droop nearly to the ground, making a rather flat-topped tree. The Lady apple is quite the opposite, being very upright. Size has some effect on planting distance. Habits of growth affect pruning and ease of picking the fruit.

Bark and Twig Characters. — Many growers can name varieties by the color of the bark. Rhode Island Greening has a dark green bark, Yellow Transparent a light green, and Wealthy a reddish brown. As a rule, red-fruited varieties have a more or less reddish bark; while varieties that produce green or uncolored fruit have a similarly colored bark. The student should examine a number of varieties and see if this is usually true. While looking at the bark, we naturally notice the buds. McIntosh buds are very pointed, Wealthy nearly round, and Ben Davis long but very blunt. We observe that Wealthy apples are produced on short branches or spurs. Ben Davis apples grow, for the most part, on long shoots. This peculiarity can be observed even at some distance. Another feature that is very prominent in Ben Davis and Twenty Ounce is the enlargement at the point where the apple is attached.

Leaf Characters. — Leaves differ greatly, and those of forest trees are very interesting. Many students will probably have made collections of leaves showing the colors they assume in the autumn. Such collections show variations among species and genera. We are interested now in variations among varieties and must look for differences that are constant. If we examine an apple tree to see which leaves

are always of the same size and shape for a given variety, we shall find that leaves on spurs are of all sizes and shapes, while leaves in the middle of a shoot are always the same for a given variety. Apple varieties can be recognized by the leaves almost as easily as by the fruit. This fact is the basis of variety-certification of nursery trees. Almost any-

Fig. 19. — Variety McIntosh apple. Heavy production, long lived, early coming into bearing, and spreading habits of growth help to make this variety popular as a permanent for the colder parts of our country.

one can learn, in a short time, to recognize a few common varieties by the leaves alone, and the student should try to do so.

We can learn much about leaves by walking through the orchard, gathering typical leaves from a number of varieties, and comparing them. Delicious has a small leaf, and Rhode Island Greening quite a large one. McIntosh leaves are light green with a reddish midrib; Rhode Island Greening has a dark green leaf with a green midrib. Wagener has a very long leaf, while the McIntosh leaf is nearly round.

We find, as we examine them, that the edges of the leaves differ greatly. Rhode Island Greening leaves have very sharp projections or indentations on the edge (serratures), while those of McIntosh leaves are very blunt, or crenate. There are other differences in the appearance of these leaves: Delicious is often folded lengthwise; Baldwin leaves are about the form of a saucer; Wagener leaves are often twisted; McIntosh leaves are quite flat. These are just a few of the more obvious differences in leaves of apple varieties. There are other tree characters that claim our attention. Perhaps it will be enough to remember a few distinguishing characters of leaves for a few leading varieties.

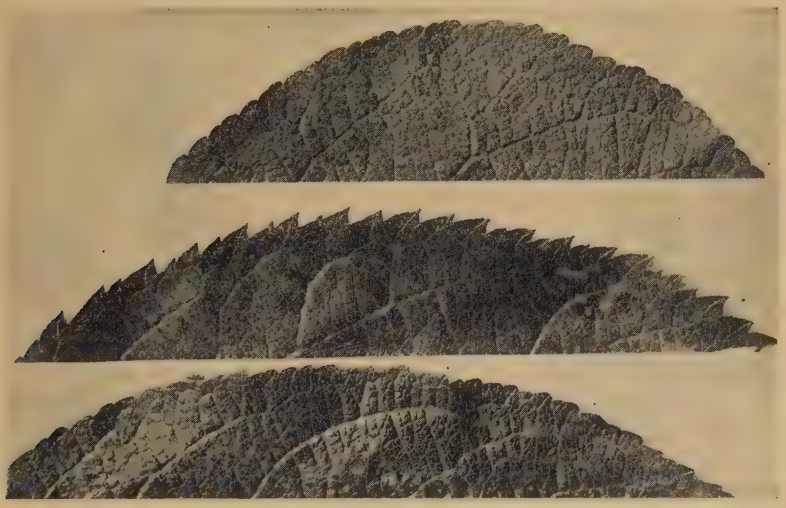


FIG. 20.

Upper: McIntosh leaf.
Middle: Rhode Island (Greening) leaf.
Lower: Cortland leaf.

Edges of leaves are very distinctive. Compare the above varieties with any others at hand. The serratures of Cortland resemble McIntosh, but the leaf is long like Ben Davis.

Biennial Bearing. — In the same orchard, we may see one Baldwin tree that is loaded with fruit, and another that has no fruit on it. The grower tells us that this is the bear-

ing year for one tree and the off-bearing year for the other. This variety tends to produce a large crop every other year and is therefore said to be biennial bearing. It has been claimed that this peculiarity is due to oversetting of fruit. Next to these biennial-bearing Baldwins we may see some McIntosh trees, which are annual bearers, each producing a crop every year. Our records indicate that annual-bearing trees produce more fruit than biennial-bearing ones, for a given variety. This matter will be discussed more fully in the courses on production.

FIG. 21.

Upper: Variety McIntosh, flat or nearly flat shaped.

Second: Variety Delicious. The leaves are folded along the mid-rib.

Third: Variety Baldwin. The leaves are shaped like a saucer.

Bottom: Variety Wagener. The leaves are twisted even more than is shown by this picture.

Susceptibility to Disease. Scab spots will be seen on the leaves of McIntosh, and cedar rust spots on Wealthy leaves. Some varieties are very free from disease; others are very susceptible to it. We shall probably see a Grimes tree with the bark dying at the surface of the ground. This failing (collar rot) is a weakness of King and Grimes varieties. We can avoid this by double working, but that adds to our expense.

Hardiness to Cold. — Yonder is a Baldwin tree, with a dead area where the limbs fork. This was caused by the cold winter several years ago. The Baldwin and Wagener are tender to cold. McIntosh and Wealthy are very hardy at low temperatures.

Age of Coming into Bearing. — Let us examine the yield records of some of our leading varieties. Delicious produces fruit early, perhaps when six or seven years old. Northern

FIG. 22. — A road-side stand for selling fruit. In some sections, the requirements of the "stand" are a very important factor in variety selection for planting. In New England, this means red apples, blue grapes, yellow-fleshed peaches, and sufficient quality to induce a given purchaser to return.

Spy often starts late, perhaps when ten or twelve years old. Skilful handling or good location may cause a tree to bear earlier than it otherwise would, but the variety tendency is constant. We shall also find that Golden Russet does not produce, on the average, as many bushels as Roxbury Russet. McIntosh yields heavy crops, and Arkansas light ones. Ability to produce is of first importance, and all our leading varieties may at least be rated "good" in this respect.

ORCHARD NOTES ON APPLE VARIETIES

Good Points	*Bad Points*
Baldwin	
Good bearer. Vigorous grower. Long-lived.	A biennial bearer. Winter-injured in the colder parts of United States.
McIntosh	
Annual and heavy bearer. Good grower. Very hardy to cold.	Susceptible to scab.

Fig. 23. — A Baldwin apple tree just starting to bear. As a rule this variety attains considerable size before starting to produce fruit.

Ben Davis	
Heavy annual bearer. Late bloomer. Vigorous grower.	Not long-lived. Susceptible to bitter rot.
Winesap	
Regular cropper. Trees are healthy.	Requires fertile soil.

Good Points	*Bad Points*
Rhode Island (Greening)	
Good grower.	Drooping habits of growth.
Long-lived.	Susceptibility to apple scab.
Wealthy	
Very hardy to cold.	Susceptible to cedar rust.
Early bearing.	Dwarfish tree that grows slowly when old.
Heavy bearer.	
Delicious	
Bears young.	Susceptible to apple scab.
Heavy bearer (almost to a fault).	Needs heavy fertilizing when old.
Good nursery tree.	
Grimes (Golden)	
Good cropper.	Collar rots.
Medium grower	
Oldenburg (Duchess)	
Very hardy to cold.	Grows slowly when old, producing a small tree.
Early bearer.	
Healthy.	Production declines with age unless heavily fertilized.
Rome	
Annual bearer.	Makes a poor nursery tree.
Blossoms late.	Only medium grower.
Jonathan	
Good cropper.	Susceptible to fire blight.
Bears young.	Only moderate grower — makes a medium-sized tree.
	Needs a fertile soil.

Thrives in many sections of the South and West.

Gravenstein	
Productive under favorable conditions.	Subject to sun scald and cankers, perhaps due to winter injury.
Desirable-shaped tree.	Often short-lived.
Vigorous grower.	

Popular variety in Nova Scotia and New England, although rather tender to cold.

Good Points	*Bad Points*
Stayman	
Usually an annual bearer. Starts bearing young. Adapted to wide range of soil.	Only moderately vigorous.

Tree characters of this variety are good.

Northern Spy	
Large, vigorous tree. Long-lived. Mature trees are usually good croppers.	Starts bearing late. Foliage subject to scab. Needs a fertile soil.

The remarkably healthy trunk of this variety has made it a favorite for top-working to other varieties. It is claimed to be a somewhat dwarfing stock.

Tree Characters of Pear Varieties. — In a similar manner, we can make orchard studies of other kinds of fruit. Compare the Chinese hybrid pears with other pears like Bartlett and Seckel. Which varieties are very upright, and which are spreading or drooping? Bartlett is more desirable in shape, from the grower's point of view, than Bosc or Louise. Compare the production records of Bartlett with those of Anjou. Bartlett is usually a heavier producer. Compare the weak growth of Comice with the vigorous growth of Clapp. The leaves of Flemish are often spotted with pear scab. If conditions permit, compare the varieties as to susceptibility to fire blight. Seckel is quite free from this disease. The age at which trees come into bearing differs quite as much among pears as among apples. Thus, Seckel comes into bearing slowly, while Bartlett starts fairly young.

Where time is limited, it is well to systematize the study of pear varieties. Make out a chart for orchard notes, like the following:

ORCHARD NOTES ON PEAR VARIETIES

Good Points	*Bad Points*
BARTLETT	
Thrives on many soils and in many sections.	Subject to fire blight.
Heavy producer.	Lacks hardiness to both heat and cold.
Desirable tree, both in shape and growth habits.	Needs cross-pollination.
Well known, both in Europe and in America.	

Good tree characters, including heavy production, have helped to place this variety first among commercial pears in America.

FIG. 24. — A Kieffer pear tree. Easy to grow; a heavy producer (although not as heavy as Clapp); partial immunity to fire blight; good canning quality recommend this variety. It is scarcely edible as a dessert fruit.

KIEFFER	
Very productive.	Tender to cold.
Very strong grower.	Does poorly on some soils.
Resistant to fire blight.	
Hardy to heat.	

The leading commercial pear of our southern sections.

Good Points	*Bad Points*
Seckel	
Immune to fire blight.	Susceptible to scab.
Heavy bearer.	Starts bearing late.
Good grower.	Does not thrive on heavy and poor soils.

This variety is as blight-resistant as any, and should become more popular in southern pear sections.

Fig. 25. — A twenty-six year old Seckel pear tree. Seckel trees grow slowly, have many small twigs, and spurs, but make very shapely trees.

Bosc (*Beurre*)	
Heavy and regular bearer.	Poor tree in nursery.
Good grower on suitable soil.	Tender to cold.
	Late in starting to bear.
Clapp (*Favorite*)	
One of our hardiest varieties to cold.	Very subject to fire blight.
One of the most productive.	
Long-lived, large-sized, and vigorous grower.	

Almost ideal in tree characters, except for susceptibility to blight.

Good Points	*Bad Points*

SHELDON

Hardy to cold.	Very subject to fire blight.
Large size and vigorous grower.	Not a good producer.
	Crop drops badly.

Rather weak in tree characters.

FIG. 26. — Bosc pear loaded with fruit. This variety grows so straggly that it is often top worked on other varieties.

LOUISE (*Bonne de Jersey*)

Very vigorous.	Tender to cold.
Productive.	Susceptible to fire blight.

ANGOULÊME (*Duchesse d'Angoulême*)

Usually heavy and regular bearer.	Requires favorable soil.
Starts bearing young.	
Healthy and vigorous.	
Grows especially well as a dwarf.	

The leading dwarf pear of America. Commonly called Duchess.

Good Points	*Bad Points*

ANJOU (*Beurre d'Anjou*)

Vigorous grower and comes into bearing early.	An uncertain cropper on many sites.
Hardy and long-lived tree.	
Does well on quince stock.	

Lack of production has reduced the popularity of this variety with many growers.

FIG. 27. — Vermont Beauty dwarf pear. Dwarf pears are often found in plantings about the home. Certain varieties like Clapp and Angoulême are especially successful as dwarfs.

COMICE (*Doyenne du Comice*)

Productive under favorable conditions.	Subject to fire blight.
	Makes a poor growth in nursery.
	Requires favorable soil and climate, and good care.

This splendid pear is very weak in tree characters.

LE CONTE

Very hardy to heat.	More subject to fire blight than Kieffer.
Does well on light soils.	
Productive.	

Finds a place in the southern part of the United States.

Good Points	*Bad Points*
WINTER NELIS	
Very productive (almost to a fault).	Straggly growth and poor shape.
Starts bearing young.	Poor nursery tree.
Relatively free from fire blight.	Requires fertile soil.

Its heavy production offsets its many disadvantages as an orchard tree.

EXERCISES

Mark the following statements *true* or *false*. If any part of the statement is untrue, mark the entire statement false.

1. Under equally favorable conditions, Ben Davis is a larger tree than (Northern) Spy.
2. The Le Conte pear is entirely immune to fire blight.
3. Leaves on an apple spur are very irregular in size and form.
4. Rhode Island (Greening) leaves have sharp serratures.
5. Bosc is a very upright-growing pear tree.
6. The Kieffer pear makes an upright growth.
7. Delicious leaves are usually folded, while McIntosh leaves are usually flat.
8. The Comice pear tree makes a very strong growth.
9. Anjou (Beurre d'Anjou) and Winter Nelis are noted as shy bearers.
10. Flemish (Beauty) foliage is very susceptible to pear scab.
11. Delicious and Baldwin come into bearing very early.
12. Paragon is noted for setting a small percentage of its blossoms.
13. Northern Spy and Rome bloom late.
14. Gravenstein is rarely injured by cold.
15. Angoulême (Duchesse d'Angoulême) is a favorite variety for growing on quince stock.
16. Bartlett, Kieffer and Clapp (Favorite) are very heavy producers.
17. King and Grimes apple trees are subject to a trouble called collar rot.

18. Cedar rust is especially severe on Wealthy and Winter Banana apple trees.

19. Seckel pear trees are very spreading in habit of growth.

20. Jonathan is quite susceptible to fire blight.

REFERENCE READINGS

Beach, S. A., "The Apples of New York," Volumes I and II, 1903.

Shaw, J. K., "Leaf Characters of Apple Varieties," Massachusetts Agricultural Experiment Station, Bulletin 208, 1922.

CHAPTER IV

FRUIT STUDY OF PEAR VARIETIES

It is not easy to conduct a fruit study of pear varieties, because of the difficulty of securing a number of varieties in prime condition at one and the same time. This difficulty is partly offset by striking differences in characters among varieties. Fruit used for study should be well-grown, picked at the proper stage of maturity, properly stored, and ripened under nearly optimum conditions. These factors have a great deal to do with the quality and appearance of pear varieties.

Size. — The extremes in size are well illustrated by the small Seckel and the very large Angoulême. Size is sometimes used as an index of maturity. As such it is only fairly accurate for varieties like Bartlett, which are uniform in size on any given tree, and is not reliable for those that are inclined to vary in size.

Shape. — Shape is perhaps the most striking single character in pear varieties. Many varieties are more or less pyriform, that is, small at the stem end and curved in on the sides. This is the artist's conception of the shape of a pear. (What variety is practically always shown in paintings of pears?) This typical pear shape is often modified by variations similar to those noted in the study of apple varieties. Thus, Bartlett is oblong pyriform. The angle formed by the flesh and a line running lengthwise of the stem varies greatly in pear varieties. It is an acute angle in Bosc and an obtuse angle in Bartlett. Therefore, the shape of Bartlett is described as oblong-obtuse pyriform. A number of varieties are obconic, viz., large at the blossom end and sloping uniformly to the stem end. Howell is a good illustration of an obconic variety. Another fairly

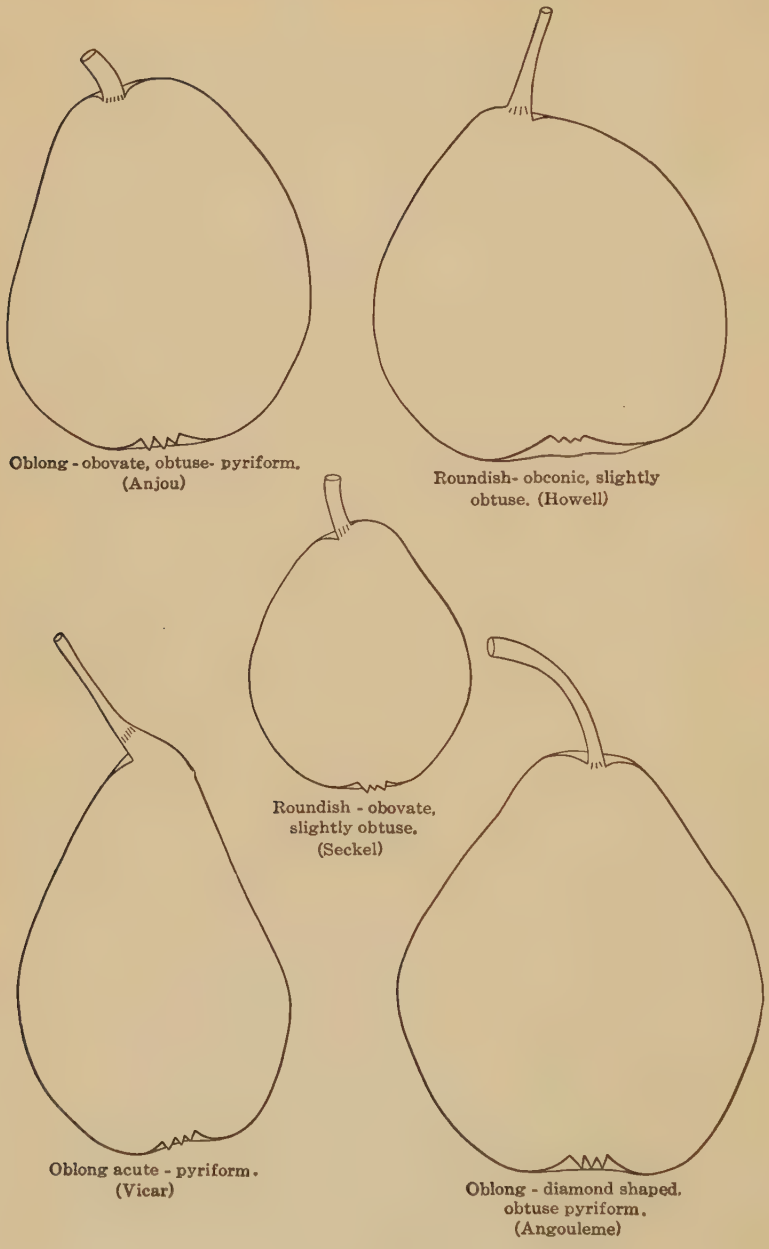
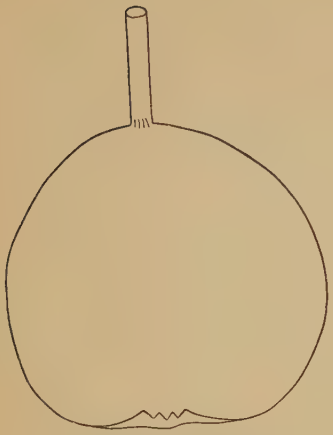
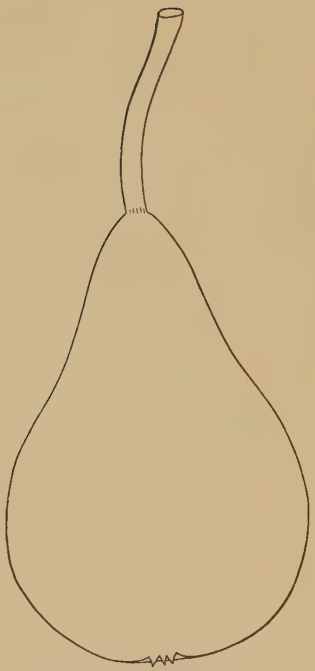

Oblong - obovate, obtuse- pyriform.
(Anjou)
Roundish- obconic, slightly
obtuse. (Howell)
Roundish - obovate,
slightly obtuse.
(Seckel)
Oblong acute - pyriform.
(Vicar)
Oblong - diamond shaped.
obtuse pyriform.
(Angouleme)

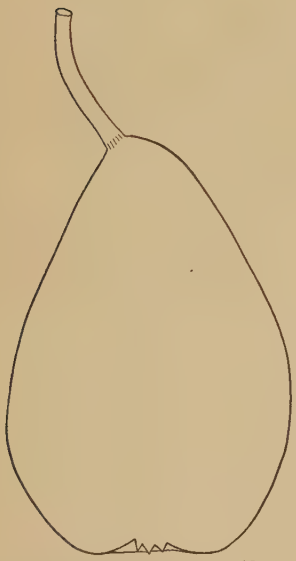
FIG. 28.



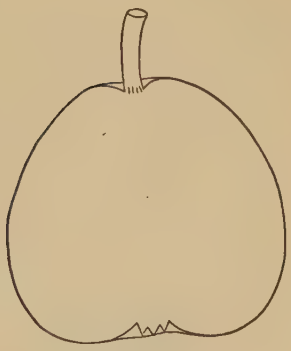
Roundish - obconic, acute.
(Diel)



Oblong, acute - pyriform with a long neck. (Bosc)



Oblong - obovate, acute - pyriform.
(Louise)



Roundish, obtuse.
(Sheldon)

FIG. 29.

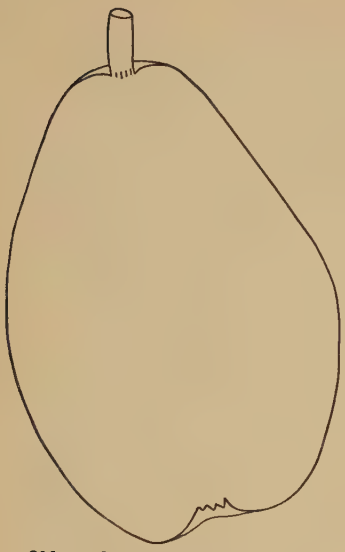
common shape is that described as obovate, and is the opposite of ovate, or egg-shaped. Le Conte and some specimens of Kieffer are good examples of the obovate pear. The student will need to test repeatedly his ability to recognize pear shapes. He will find it a good plan to make outline sketches of varieties to help him remember their shapes.

Color. — Color in pears is a very variable character. Location, time of picking, and degree of ripeness cause variations in color. Russet predominates on a number of varieties, like Winter Nelis, Bosc and Sheldon. Others are usually blushed with some shade of red, as Clapp, Flemish, and Vermont Beauty. The under-color, as in apples, changes as the fruit ripens, and is usually some shade of yellow.

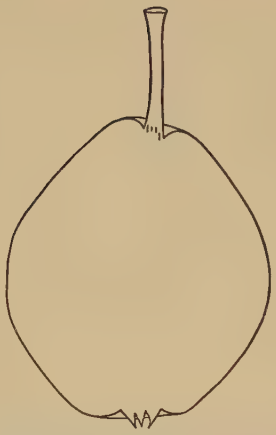
Skin. — Pears, as a rule, are picked and shipped when hard ripe. For this reason, the character of the skin is not quite as important as in apple varieties. The author's students often say that they like Winter Nelis if they remove the tough, thick skin. Pear skin also contains many dots, but the writer has not found them very useful in recognizing varieties.

Stem. — It is an interesting exercise to set one specimen each of a number of pear varieties in a row and have the class compare the stems. Even without selecting varieties, the result is usually very striking. Note, in addition to length and thickness, how the stems are inserted. Clapp is usually fleshy at the point of insertion. Some stems are inserted at an angle, as those of Souvenir du Congress and Vicar (of Winkfield). The stem is certainly one of the most important characters in recognizing pear varieties. Unfortunately for our studies, careless pickers often break the stems.

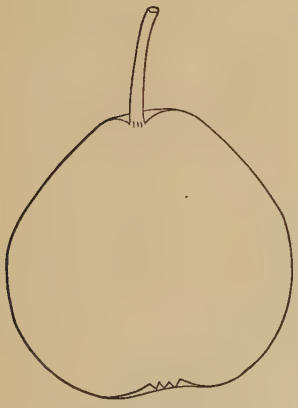
The depression at the stem end, known as the cavity, is often lacking and never very large. Sheldon has one of the largest cavities among pears. The basin is often shallower than in apples, and in many cases is wrinkled or furrowed,



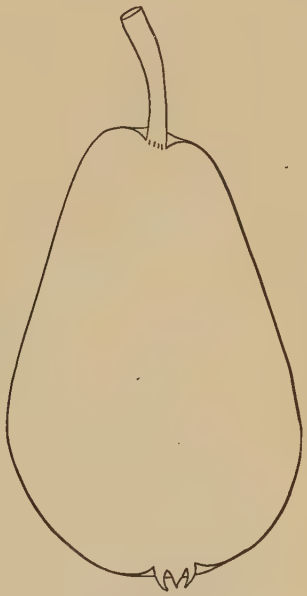
Oblong-obovate, obtuse-pyriform.
(Le Conte)



Diamond shaped ,obtuse slightly pyriform.
(Kieffer)



Roundish, obtuse-pyriform.
(Winter Nelis)



Oblong, obtuse-pyriform.
(Bartlett)

FIG. 30.

with sloping sides. Le Conte has a narrow basin. Vicar (of Winkfield) has a very shallow basin.

Calyx. — The calyx shows greater variation among pear varieties than in apples. It is often deciduous in Le Conte, very small in Vermont Beauty, quite large in Lincoln Coreless, and with small, narrow, short lobes in Duchesse d'Angoulême. It is usually open or, at least, partly so. The calyx tube varies in shape from funnel-shaped to conical and the stamens from basal to distant.

Pear Flesh and Flavor. — It is interesting to compare the internal characters of pear varieties with those of the apple. The core of the pear is usually smaller and more oblong. Many varieties have an axile core, which is not so common among apple varieties. The flesh is strikingly different, often granular with grit spots. It will add interest to examine some of these grit spots under a microscope. Many varieties of pears have flesh that melts in the mouth or tastes buttery; terms indicating both of these qualities are used in describing pear flesh. As a rule, the flesh of pears is more juicy than that of apples. Many pears have a spicy or aromatic flavor. The flavor of our best varieties of pears, when well-grown, well-ripened and in prime condition, can hardly be excelled.

Core Characters. — The core line in pears is perhaps less conspicuous than in apples. Carpels and seeds resemble those of the apple, varying slightly in shape and color. Core softening, or core rot, is quite common in pears, apparently because ripening progresses more rapidly in the core than in the torus flesh. Clapp and Le Conte are noted offenders in this respect, although there are many others. Regardless of its cause, core rot is quite characteristic of certain varieties and adds to the problems of the grower. It is thought to be due to rapid oxidase activity about the core. Early picking helps to overcome this trouble.

Technical Description. — After completing the study of pear varieties, students should try various tests similar to those described for apples. Identification contests add to

the interest of the study. The student should be able to make, from memory, a few accurate descriptions similar to those made by Hedrick.[1] Pear judging is another method of reviewing, and is especially valuable if a number of substitutes are put in. Enough fruit should be available to enable students to become familiar with the variety and not merely with individual specimens. Many assignments based upon the same varieties are desirable, as the students will become more familiar with these varieties. It is a good plan to try classifying the varieties into groups that resemble each other, and then devise ways of distinguishing the varieties within the group.

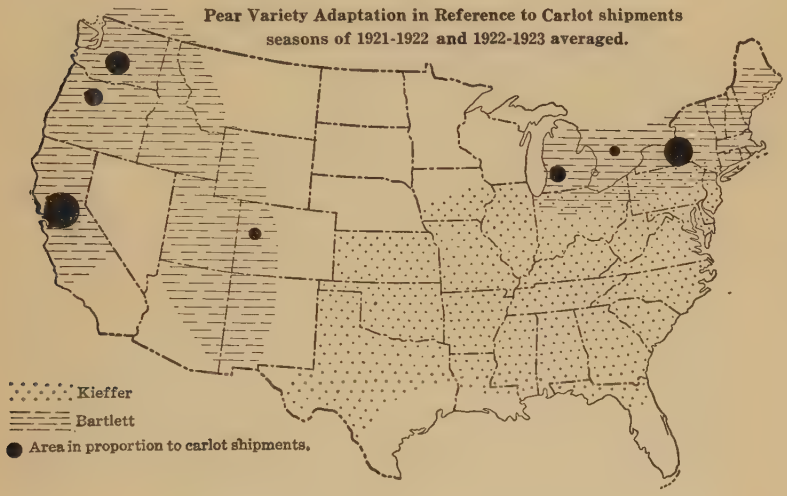

Pear Variety Adaptation in Reference to Carlot shipments
seasons of 1921-1922 and 1922-1923 averaged.
Kieffer
Bartlett
Area in proportion to carlot shipments.

FIG. 31.

Variety Adaptation. — In addition to the usual factors affecting variety adaptation, the distribution of pear varieties is strikingly limited by the prevalence and severity of fire blight. Southern sections of the eastern United States are limited to Seckel, and Chinese hybrid varieties like Kieffer. The outline map will illustrate this graphically for Bartlett and Kieffer varieties. The Bartlett variety has been an

[1] Hedrick, U. P., "The Pears of New York," 1921.

important factor in the development of our leading pear-production districts.

The Quince. — The characters of the quince are quite similar to those of the pear, when both are raw; when cooked, the two fruits are very unlike. How may this difference be explained?

NOTES ON A FEW VARIETIES OF PEARS

Good Points	*Bad Points*

Clapp (*Favorite*)

Origin: Dorchester, Massachusetts.

Large, attractive fruit.	Fruit rots at core.
Early ripening (earliest of commercially important varieties).	Does not ship well.
Good quality.	

One of our more popular varieties for home plantings and local markets.

Bartlett

Origin: England.

Large, attractive fruit.	Only good in quality.
Good keeper and shipper.	
Good pear for canning.	

Long the leading commercial and home pear of America. Grown in Europe under the name of Williams' Bon Chretien.

Bosc (*Beurre*)

Origin: Belgium.

Very good in quality.	Mostly tree characters.
Distinctive shape.	
Attractive russet color.	
Handles well.	
Tender, melting flesh.	

A good commercial pear and justly popular in home plantings. The variety is sometimes top-worked on other varieties to avoid weaknesses in tree characters.

Good Points	*Bad Points*

ANJOU (*Beurre d'Anjou*)

Origin: Europe.

Ships and handles well.	Variable in quality.
Good in quality.	
Smooth skin and desirable shape.	
Good keeper.	

A standard early winter variety. Grown especially in New York.

ANGOULÊME (*Duchesse d'Angoulême*)

Origin: France.

Very large in size.	Poorly grown specimens are poor in quality.
Ships and handles well.	
Keeps well.	

A splendid variety for the amateur, and grown to some extent commercially.

COMICE (*Doyenne du Comice*)

Origin: France.

High quality.	Mostly tree characters.
Attractive fruit.	
Very large size.	

A popular commercial variety of the Pacific Coast. This variety does not seem to thrive in our eastern sections.

KIEFFER

Origin: By Peter Kieffer near Philadelphia.

Attractive when canned.	Low quality as a dessert fruit.
Good keeper.	
Ships and handles well.	

Grown in large numbers for market, although very low in dessert quality. Second to Bartlett in number of trees grown.

Good Points *Bad Points*

Le Conte

Origin: Probably near Philadelphia.

Large, attractive fruit.

Core rots badly.
Very low in quality.

Recommended for planting in the extreme South.

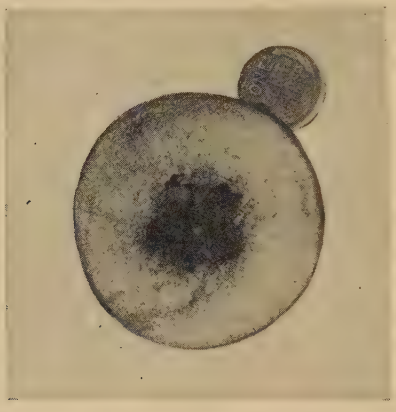


Fig. 32. — Core rot in a Le Conte pear. The dark area indicates the extent of decay. Some varieties like Clapp and Le Conte will often core rot on the trees if not picked promptly when mature.

Seckel

Origin: Near Philadelphia, by "Duch" Jacob, a sportsman. Introduced by Mr. Seckel.

High quality both in flesh and skin.
High culinary quality.
Not likely to develop core rot.

Small size.
Fruit scabs badly.

Many growers consider it too small for a market pear. Very desirable for local markets and home plantings. Grown commercially in New England.

Sheldon

Origin: On the farm of Major Sheldon of Huron, New York.

Good size and shape.
High quality.
Handles well.

Mostly tree characters.

Popular in home plantings. Grown to a limited extent commercially.

Good Points	*Bad Points*

Winter Nelis

Origin: Belgium.

Late keeper.	Small size and sometimes not attractive.
Ships and handles well.	
High quality with good flesh characters.	

Grown to a limited extent commercially.

Louise (*Bonne de Jersey*)

Origin: France.

High dessert quality.	Just about average in many ways.
Fairly attractive.	Not very well known on markets.
Keeps and ships well.	

A splendid home variety either as a standard or dwarf. Popular in Europe.

Vermont Beauty

Origin: Vermont.

Bright, attractive colors.	Small size of fruit.
High quality.	
Keeps and handles well.	

A very attractive variety for home plantings. This variety has done well as a dwarf at Amherst, Massachusetts.

Vicar (*of Winkfield*)

Origin: France.

Good culinary pear.	Poor quality, somewhat astringent.
Keeps and handles well.	Only moderately attractive.

Rarely planted at present.

Howell

Origin: By Thomas Howell of Connecticut.

Uniform on tree.	Only medium quality.
Comparatively free from scab.	Not especially attractive.

Occasionally grown, but has few outstanding merits.

Good Points	*Bad Points*
Diel	
Origin: Belgium.	
Large fruit.	Variable quality, sometimes astringent.
Keeps and handles well.	Coarse flesh.
	Not very attractive.

Found in some of the pear orchards of eastern North America. Not recommended for planting.

EXERCISES

Place a plus sign before each statement that is true, and a minus sign before each statement that is false. If any part of the statement is not true, consider the entire statement as false.

1. A pyriform pear has concave sides.
2. Clapp pears are very likely to develop core rot.
3. Seckel and Winter Nelis have spicy-flavored skins.
4. Howell and Angoulême are obtuse-formed varieties.
5. Bosc has a long stem.
6. Anjou has a slender, short stem.
7. The fruit of Seckel is quite likely to rot at the core.
8. Angoulême has melting flesh.
9. Bosc has an attractive russet skin.
10. Comice has a spicy flavor, and is somewhat aromatic.
11. The Howell pear is obconic in form.
12. The Sheldon pear has a deep cavity and is roundish in form.
13. The Louise pear often has stippled red coloring.
14. Vermont Beauty has a bright red cheek.
15. Bartlett pears have an attractive yellow color.
16. Chinese hybrid varieties of pears are likely to have grit cells.
17. Vicar (of Winkfield) pears have their stems inserted at an angle.
18. The fruit of Flemish pears is very subject to pear scab.
19. Clapp is the earliest variety (of importance) to ripen.
20. Winter Nelis is a late keeper.
21. The flesh of Diel often tastes somewhat astringent.

REFERENCE READINGS

Leroy, André, "Dictionnaire de Pomologie," Tome I, Poires, 1867.

CHAPTER V

CLASSIFICATION OF POMACEOUS FRUITS

The classification of plants and plant varieties has long been the goal of students of botany. It is likewise one of the objects to be attained in a systematic study of fruit. Allow a student to study several hundred varieties without telling him to classify them, and he will begin to do so of his own accord. One such classification of apple varieties was made by one of the author's students. He simply divided the varieties into groups because the fruits looked more or less alike. This was really an attempt at a natural classification, considering fruit characters only. The student's second step was to separate the varieties within his groups, considering only one character at a time. Thus, he divided the hard, red apples into the red-fleshed, yellow-fleshed, and green-fleshed varieties; the resulting groups were then subdivided on the basis of the dots, which were characterized as raised, sunken, or submerged. This latter step was an arbitrary classification.

Natural and Artificial Classifications. — This student, without knowing it, made use of the two methods of classification recognized in the field of natural science. A good illustration of natural classification is seen in the Winesap group among apples. This group consists of hard, red apples with yellowish, fairly firm flesh. All are good keepers. They vary from conical to round in shape, and are about medium in size. The dots are usually areolar. Many of the varieties have pollination troubles. The group grows best in the warmer parts of our apple-producing areas (Virginia to Colorado). Many of the varieties are seedlings of Winesap. This group includes Stayman, Arkansas or Mammoth Black Twig, Kinnard, Paragon, and Winesap.

Kinds of Pomaceous Fruits. — The writer, while still a student, was asked by his instructor to sort out a quantity of nursery trees in accordance with the kinds of fruit. The variety names were new to him. Some were readily placed in the apple, plum, or cherry groups, but others proved puzzling. This makes a very nice exercise and illustrates our classification of fruits.

Core or Pomaceous Fruits

Common Apple, *Pyrus malus*, Linn.
Crab-apple, *Pyrus baccata*, Linn.
European Pear, *Pyrus communis*, Linn.
Chinese or Sand Pear, *Pyrus serotina*, Rehd.
Common Quince, *Cydonia oblonga*, Mill.
Atlantic or Garland Crab-apple, *Pyrus coronaria*, Linn.
Prairie or Middle-western Crab-apple, *Pyrus ioensis*, Bailey.

Fig. 33. — Apples (right), pears (left), and crab-apples bear blossoms terminally on spurs. The pear tends to leaf out later than the apple. The quince bears blossoms unlike any other pome fruit. What do you understand by the co-terminal blooming of the quince?

The Apple. — The apple is the most important and popular of the deciduous fruits in America. It has been grown for over two thousand years and was frequently mentioned

by early Greek and Roman writers. It is supposed to have originated in the region south of the Caucasus. The early settlers brought this fruit to America very soon after the first settlements were made; yet, at the present time, most of our varieties are of American origin. The species are variable and are adapted to the temperate zone, extending from southern Canada to and including the southern part of the United States.

Apple Keys or Artificial Classifications. — In order to see how fruit keys are made, it is only necessary to take a dozen hard, red apples, representing as many varieties, and devise a scheme for telling them apart. Old publications on fruit are full of such fruit keys. Some of them worked fairly well for the varieties common at the time when the keys were made, but would be of little use to-day because of the many new varieties that have since been introduced. A man who had spent all of his life in fruit work was asked to name a variety of apples found growing in Virginia. He was unable to name it, although he had hundreds of trees of the same variety in his New England orchard. Variations due to climate, as well as variations in the same orchard, are very great, and have so far prevented anyone from making a perfect key.

CARPENTER AND STAFFORD'S KEY

Carpenter and Stafford have made an apple key which is the best the author has ever used. The following is taken from their publication and will illustrate how their key is made.

KEY TO COMMERCIAL APPLES

Cross Section	Skin Color		Flesh Color	Carpel	Conic								Round						Oblate		Oblong	
					Conic		Round		Oblate		Oblong		Round		Oblate		Oblong					
					Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.
Round	Self-colored	Blushed	White	Tufted																		
				Not Tf							290		386	434		530				722		
			Yellow	Tufted			99	147	195	243			387	435	483					723		
				Not Tf	4		100		196		292		388	436	484			628	676			
			Green	Tufted											485							
				Not Tf																		
			Red	Tufted																		
				Not Tf			104				296			440	488	536						
		Not Blushed	White	Tufted			105						393									
				Not Tf			106		202													
			Yellow	Tufted			107				299		395		491						779	
				Not Tf			108		204				396	444	492			636	684			
			Green	Tufted																		
				Not Tf																		
			Red	Tufted																		
				Not Tf																		
	Striped		White	Tufted	17		113	161						449		545						
				Not Tf	18		114		210	258	306		402	450	498	546						
			Yellow	Tufted	19		115	163	211		307		403	451	499	547				739		
				Not Tf	20		116		212	260	308		404	452	500	548	586	644		740		
			Green	Tufted			117		213													
				Not Tf			118								502							
			Red	Tufted																		
				Not Tf			120							456	504	552	600					

KEY TO COMMERCIAL APPLES—*Continued*

Cross Section	Skin Color	Flesh Color	Carpel	Conic								Round						Oblate		Oblong	
				Conic		Round		Oblate		Oblong		Round		Oblate		Oblong					
				Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.	Reg.	Irr.
Ribbed	Self-colored	Blushed	White	Tufted			121		217		313				505							
				Not Tf							314				506				698			
			Yellow	Tufted				171	219	267		363	411	459	507	555		651	699	747		843
				Not Tf			124			268	316	364	412			556						
			Green	Tufted																		
				Not Tf																		
			Red	Tufted																		
				Not Tf							320											
		Not Blushed	White	Tufted			129	177	225		321	369										
				Not Tf	34		130			274	322				514				706	754		
			Yellow	Tufted			131	179		275	323	371	419	467	515	563		659		755	803	851
				Not Tf							324	372	420	468	516			660				
			Green	Tufted																		
				Not Tf																		
			Red	Tufted																		
				Not Tf																		
		Striped	White	Tufted			137	185	233	281			425		521							
				Not Tf	42		138		234		330				522	570			714	762		
			Yellow	Tufted	43	91	139	187	235	283	331	379	427	475	523	571		667	715	763		859
				Not Tf	44		140	188			332		428			572				764		860
			Green	Tufted																		
				Not Tf				190		286												
			Red	Tufted	47		143		239				431		527							
				Not Tf	48			192	240		336		432		528	576			720			

C. C. Carpenter and I. B. Stafford

Sour Apple Groups

4 Gano
17 Cooper Market
18 Ben Davis
19 Cooper Market
20 Alexander
Winesap
42 Ben Davis
43 Delicious
44 Alexander
Winesap
47 Williams
48 Canada Baldwin
91 Ralls
Stayman
99 Fallawater
Limbertwig
100 Jonathan
King David
104 King David
106 Swayzie
108 Swayzie
113 Cooper Market
114 Ben Davis
Stump
Tetofski
Wealthy
115 Cooper Market
Ingram
Magog
Minkler
Pennock
Ribston
Salome
Walbridge
116 Alexander
Cox Orange
Jefferis
Jonathan
Magog
Missouri Pippin
Pennock
Red Canada
Rome
Stump
Twenty Ounce
Willowtwig
Winesap
117 Minkler
118 Plumb Cider
Red Canada
Willowtwig
120 Wealthy
124 Gilpin
Jonathan
Opalescent
129 Yellow Transparent
130 MacMahon
131 White Pearmain
137 Melon
Red Astrachan
138 Ben Davis
139 Deacon Jones
Melon
Northern Spy
Sops of Wine
Stark
140 Alexander
Benoni
Jonathan
Mother
Northern Spy
Winesap
143 Red Astrachan
Sops of Wine
147 Baldwin
161 Bismarck
Hubbardston
163 Baldwin
Bethel
Hubbardston
Smith Cider
171 Banana
Spitzenburg
177 Titus Pippin
179 Titus Pippin
185 Bietigheimer
187 Spitzenburg
Stayman
188 Scott
190 Red Canada
192 Scott
195 Limbertwig
196 Patten
202 Swayzie
204 Patten
Swayzie
210 Shiawassee
211 Ingram
Minkler
Ribston
212 Cox Orange
Jefferis
213 Minkler
217 Boiken
219 Arkansas
Huntsman
225 Yellow Transparent
233 Detroit Red
Melon
234 Haas
235 Arkansas
Melon
239 Detroit Red
240 Haas

243 Monmouth
258 Hurlbut
260 Hibernal
Hurlbut
267 Monmouth
268 Peck
274 Primate
275 Roxbury
281 Bietigheimer
283 Ralls
286 Red Canada
290 Red June
292 Jonathan
296 Red June
299 Porter
306 Sheriff
Stump
307 Black Gilliflower
308 Jonathan
Stump
314 Red June
316 Gilpin
Jonathan
320 Red June
323 White Pearmain
324 Ortley
330 Chenango
St. Lawrence
331 Black Gilliflower
Deacon Jones
Delicious
Northern Spy
332 Jonathan
Northern Spy
336 St. Lawrence
363 Banana
Canada Reinette
Spitzenburg
Yellow Bellflower
364 Golden Delicious
369 Titus Pippin
371 Titus Pippin
Yellow Bellflower
372 Golden Delicious
379 Spitzenburg
386 Longfield
387 Arkansas Black
Fallawater
388 Oliver
395 Golden Russet
402 Fameuse
Sheriff
403 Arkansas Black
Magog
Salome
Sutton
Walbridge
Westfield
404 Magog
Missouri Pippin
Oldenburg
Oliver
Rome
Twenty Ounce
411 Swaar
412 Gilpin
419 Swaar
425 Red Astrachan
427 Kinnard
Sops of Wine
Stark
428 Benoni
Mother
431 Red Astrachan
Sops of Wine
432 Canada Baldwin
434 McIntosh
435 Baldwin
436 Golden Reinette
440 McIntosh
444 Northwestern
449 Pewaukee
Wolf River
450 McIntosh
451 Baldwin
Bethel
Wolf River
452 Golden Reinette
456 McIntosh
459 Holland Pippin
468 Northwestern
475 Blue Pearmain
483 Lawver
Mann
484 King David
Oliver
R. I. Greening
485 Lawver
488 King David
491 Golden Russet
Mann
492 R. I. Greening
498 Sheriff
Tetofski
Wealthy
499 Pennock
Sutton
500 Cox Orange
Jefferis
Jewett Red
Oldenburg
Oliver
Pennock
Willowtwig
502 Willowtwig
504 Wealthy
505 Boiken
506 Early Harvest
507 Arkansas
Huntsman

Swaar
514 Early Harvest
515 Swaar
521 Detroit Red
522 St. Lawrence
523 Arkansas
527 Detroit Red
528 Canada Baldwin
St. Lawrence
530 McIntosh
536 McIntosh
545 Bismarck
Wolf River
546 Hurlbut
McIntosh
547 Blenheim
Bonum
Rambo
Wolf River
548 Hibernal
Hurlbut
Jewett Red
552 McIntosh
555 Canada Reinette
Holland Pippin
Washington Royal
556 Peck
563 Washington Royal
570 Wagener
571 Blue Pearmain
Gravenstein
Smokehouse
Tompkins King
York Imperial
572 Akin
Buckingham
Scott
576 Scott
596 Rome
628 Golden Reinette
636 Northwestern
644 Golden Reinette
651 Gideon
Holland Pippin
Yellow Bellflower
659 Yellow Bellflower
660 Northwestern
667 Tompkins King
York Imperial
676 Patten
684 Patten
698 Early Harvest
699 Arkansas
706 Early Harvest
714 Haas
715 Arkansas
Kinnard
720 Haas
722 Lady
Maiden Blush
723 Monmouth
739 Blenheim
Rambo
740 Hibernal
747 Banana
Canada Reinette
Monmouth
754 Primate
755 Roxbury
762 Wagener
763 Gravenstein
Smokehouse
764 Akin
Buckingham
Domine
779 Grimes
Porter
803 Grimes
843 Esopus Spitzenburg
851 Newtown
859 Esopus Spitzenburg
860 Domine

Sweet Apple Groups

34 Autumn Bough
43 Delicious
99 Fallawater
105 Tolman
107 Tolman
115 Hogg Island Sweet
116 Hogg Island Sweet
121 Bough
129 Bough
161 Hubbardston
163 Hubbardston
179 Pumpkin Sweet
211 Hogg Island Sweet
212 Hogg Island Sweet
313 Bough
321 Bough
322 Autumn Bough
331 Delicious
364 Golden Delicious
372 Golden Delicious
387 Baker Sweet
Fallawater
393 Tolman
395 Baker Sweet
Tolman
396 Golden Sweet

420 Golden Sweet
427 Bailey Sweet
467 Pumpkin Sweet
483 Baker Sweet
491 Baker Sweet
492 Golden Sweet
516 Golden Sweet
555 Washington Royal
563 Washington Royal

Using an Apple Key. — The success of a key depends on the constancy of the characters used and on the ability of everyone to recognize the differences between them. The author once used a key that separated apple varieties into two groups: sweet apples, and sour apples. He encountered many subacid varieties that might have been classed in either the sweet or the sour group. Moreover, over-stored specimens of sour varieties lose acidity and taste like sweet apples.

In Carpenter and Stafford's key, shape of cross section is considered the most constant character and the easiest to recognize; skin color comes second, and flesh color third. It will be noted that in this key a given variety may occur under more than one number, just as a given title may be found under more than one heading in a library catalogue. The full key includes supplementary keys for use in cases where more than one variety is listed under a number. The author has never used these supplementary keys, but prefers to turn to "The Apples of New York," which also serves to check identification of an unknown. The student is advised to get a specimen of some variety of apple that is unknown to him, and try to find out its name, using either the above or any other key. It will be found that skill is required to recognize characters. A little practice will greatly increase the accuracy of one's work with the key.

SHAW'S KEY FOR LEAVES OF APPLE VARIETIES

The following is a brief extract from Shaw's key for leaves of apple varieties. This is especially useful for recognizing varieties in the nursery row:

A. Leaves large, broad, flat, or only slightly folded.

1. Sides not waved or only slightly so.
   - *a. Gravenstein.* Leaves broad, oblong; serrations dull, shallow, regular.
   - *b. McIntosh.* Leaves broad, oval, base often cordate, edges often slightly folded; serrations dull and shallow, especially at base.
   - *c. Rhode Island (Greening).* Serrations very sharp and distinct.
2. Sides more or less waved.
   - *a. Red Astrachan.* Leaf waves, "Crinkly" or wrinkled, not reaching to the midrib.
   - *b. Oldenburg.* Leaves broad at base and apex.
   - *c. Wealthy.* Leaf relatively narrow at base and apex; midrib often tending to spiral form or reflex at tip.

B. Leaves more or less distinctly folded.

1. Folding "saucer-shaped" or broad U-shaped.
   - *a. Baldwin.* Leaves broad, distinctly saucer-shaped; serrations sharp, close set, and usually curved.
   - *b. Roxbury (Russet).* Serrations distinct and only moderately sharp.
   - *c. Winter Banana.* Leaves rather long and narrow; serrations regular and dull.
2. Folding narrow U-shaped.
   - *a.* Serrations dull.
     1. *Williams.* Waves large, coarse, serrations uniform.
     2. *Wolf River.* Leaf only moderately folded, oval, narrowing at base and apex; serrations coarse, dull.
     3. *Yellow Transparent.* Leaves broad at base, and rather narrow at apex; serrations uniform, shallow.
   - *b.* Serrations at least moderately sharp.
     1. *Delicious.* Leaves narrow at apex; serrations coarse and distinct.
     2. *Wagener.* Leaves strongly folded; midrib much reflexed.
     3. *(Northern) Spy.* Leaves sometimes little folded, upright; serrations sharp.

Natural Classifications of Apples. — One of the early attempts to form a natural classification of apple varieties was the outcome of the organization of a committee to simplify and revise the nomenclature of Russian apples. This gave a very good grouping for the Russian apples, which, however, represent only a few of the many varieties found in our orchards to-day. The New York Agricultural Experiment Station, in Bulletin 275, presents a list of two

hundred and seventy-eight varieties placed in thirty-six groups. This classification of apple varieties, as modified by Keil, is one of the best we have at this time.

KEIL'S GROUP CLASSIFICATION OF APPLES

Aport Group

Large, handsome, coarse-textured apples, in season late summer or fall, quality medium to poor.

Alexander	Bismarck	Judson
Aport	Constantine	McMahon
Aport Orient	Great Mogul	Thompson
Arabskee	Howard Best	Wolf River
Bietigheimer		

Baldwin Group

Highly-colored winter apples, of good size and good to excellent flavor, with marked similarities in texture, flavor, form and coloring.

Babbitt	Olympia	Sutton
Baldwin	Red Russet	Tufts

Ben Davis Group

Rather large, brightly-colored, with thick skin, and firm, coarse flesh of poor quality. Endure rough handling, and keep well in storage.

Arkansas Beauty	Dickinson	Moneymaker
Arkansas Belle	Eicke	Highfill
Ben Davis	Etris	Red Ben Davis
Black Ben Davis	Florence	Shirley
Calumet	Gano	Wallace Howard
Coffeit		

Black Gilliflower Group

Medium size, dark red coloring, oblong or ovate form, good quality, but rather dry and coarse in texture. Less hardy than the Baldwin Group, and more particular as to soils.

Black Gilliflower	Skelton	Striped Gilliflower
Lady Finger	Scallop Gilliflower	

Blue Pearmain Group

Somewhat large, dull red with pronounced bluish bloom, mild flavor, fair quality, dense texture, and thick skins. Adapted to northern conditions.

Baltimore	Du Bois	Perry
Baxter	Gideon Sweet	Rutledge
Bethel	Jewett Red	Scarlet Beauty
Blue Pearmain	Mabie (Sweet)	Stone
Bonum	Monroe (Sweet)	Victoria
Corp Choice	Oel Austin	Windsor

Chenango Group

Medium-sized, striped bright red, oblong-conic, of good quality, with delicate texture and peculiar aroma. Adaptation similar to that of Baldwin.

Chenango	Stump

Early Harvest Group

Summer apples of medium size, pale yellow or nearly white in color, of good but not of superior quality.

Cooper Early White	Early Harvest	Parry White
Doyle	Early Ripe	Warfield

Fameuse Group

Medium-sized, handsomely colored, roundish-oblate or conical; thin skin, good to excellent quality, with clear white, tender flesh. The tendency to reproduce the type from seed is a striking peculiarity. A susceptibility to attacks of apple scab is also prominent. As a group, these varieties are much better in northern latitudes.

Boy's Delight	La Victoire	St. Lawrence
Butter	Fameuse Sucre	Scarlet Pippin
Canada Baldwin	Hilaire	Shiawassee
Duling	Louise	Striped Fameuse
Fameuse	McIntosh	Switzer
Fameuse No. 1		

Hibernal Group

Probably the hardiest varieties of Russian origin, adapted to a cold climate and maturing in a short season.

Bogdanoff Glass
Hibernal
Ostrakoff
Romna

Keswick Group

Early apples of English origin, pale green or yellowish in color, with an extreme susceptibility to blight. Indifferent quality.

Colton
Keswick
Lord Suffield

Lady Group

Very small, roundish-oblate, brilliantly colored apples of sprightly flavor and excellent dessert quality.

Black Lady
Helen
Highland Beauty
Lady
Large Lady
Rose Lady
Sleight
Star Lady

Lawver Group

Highly colored; rather coarse, firm, dense texture, and inferior quality. Long keepers.

Akin
Lawver
McAfee

Limbertwig Group

Adapted to southern conditions. Poor quality and rather small size. (Could be added as a section to the Romanite Group.)

Green Limbertwig
Red Limbertwig

Longfield Group

Of Russian origin. Indifferent quality.

English Pippin
Longfield

Liveland Group

Of Russian origin.

Anisim	Liveland	Red Wine

Newtown Spitzenburg Group

Medium size, round-oblate, red-striped, high quality.

Bethlehemite	Duncan	Newtown Spitzenburg

Northern Spy Group

Large, red-striped, roundish-oblate, ribbed, with delicate to heavy bloom; juicy, crisp, fine-grained, and good to excellent in quality. Fastidious as to soils.

Arnold	Hagloe	Stanard
Doctor	Melon	Wagener
Family	Northern Spy	Wagener Improved
Fanny	Ontario	

Oldenburg Group

Medium to large in size, usually red-striped, acid or subacid, valuable mostly for culinary uses. In season summer and fall. Of Russian origin, with a few exceptions. The group includes several of our best summer culinary varieties.

Anarnoe	Golden White	Patten Greening
Autumn Streaked	Henry Clay	Pewaukee
Berkoff	Hoadley	Rolfe
Borovinka	July	Striped Winter
Champagne	Lead	Tetofsky
Charlamoff	Lou	Titus
Crimean	Maxon	University
Dudley	Milwaukee	Wm. Prince
Falix	Okabena	Yahnke
Gladstone	Oldenburg	Zettle
Glass Green		

Gravenstein Section

Banks (Red Gravenstein)	Gravenstein	Winterstein

Wealthy Section

Peter	Wealthy

Ralls Group

Medium to small, somewhat dull in color; juicy, good quality; late keepers.

Doctor Walker	Ingram	Salome
Father Abram	Milam	Smith Cider
Giant Jeniton	Ralls	Walbridge

Rambo Group

Domine	Milden	Summer Rambo
English Rambo	Pennsylvania Red-streak	Wells
Grosh	Rambo	Vandevere
Lacker	Smokehouse	Van Eaton

Red Astrachan Group

Summer apples, medium to large in size; crisp, subacid, fair to good quality.

Anis	Red Astrachan	White Astrachan

Red June Group

Medium to small summer apples, brilliantly colored; of tender flesh and mild flavor. Fine for dessert.

Red June	San Jacinto

Reinette Group

With few exceptions, rather large in size, of green or yellow ground color, with or without blush; generally of good quality. A large, poorly defined group, here divided into four sections:

Fall Pippin Section

Albion	Golden Pippin	Maiden Blush
Banana	Greenville	Newark Pippin
Boiken	Hawley	Ohio Pippin
Crowns	Holland Pippin	Reinette Pippin
Ewalt	Hyde King	Sharp
Elgin Pippin	Iowa Blush	Stuart Golden
Fall Harvey	Jack	Walker Beauty
Fall Pippin	Lehigh Greening	White Pippin
French Pippin	Landsberg	White Spanish Reinette
Geneva Pippin	Lowell	York Pippin
Gideon	Magenta	

Rhode Island Section

Autumn Swaar	Fall Orange	Sheddan
Bottle Greening	Holland Winter	Starr
Canada Reinette	Monmouth	Sweet Greening
Carolina Greening	Northwestern	Tobias Pippin
Dona Maria	Rhode Island	

Newtown Section

Admirable	Huntsman	Pickard Reserve
Belmont	Middle	Shannon
Golden Delicious	Peck	Slingerland
Green Newtown	Perry Russet	Yellow Newtown
Grimes		

Swaar Section

Mann	Seneca Favorite	Swaar
Nixonite	Sequoia	Tolman

ROMANITE GROUP

Variable in size; good to poor in quality; nearly all late keepers. Seedlings from varieties of this group may be expected to retain group characteristics.

Bayard	Linville	Pennock
Bentley (Sweet)	Loy	Romanite
Buckingham	McCuller	Sierra
Edwards	Minkler	Sheriff
Fink	Missing Link	Springdale
Gilpin	Monocacy	Stark
Glenlock	Nero	Virginia Beauty
Hughes Late	Nottingham	Whinery
Lansingberg	Oliver Red	York Imperial

ROME BEAUTY GROUP

Highly colored, firm flesh; medium in quality unless grown under the most favorable conditions.

Ben Hur	Gallia Beauty	Lankford
Ensee	Giffin	Rome Beauty

Russet Group

Small to above medium in size; russet skins; dense but fine-grained texture; good to excellent quality; some good keepers.

Brownlees	Golden Russet	Roxbury
Bullock	Hunt Russet	Sailee Russet
Carpentin	Long Island Russet	Swayzie
English Russet	Pomme Gris	Sweet Russet

Spitzenburg Group

Medium to large size; highly colored, crisp, juicy flesh; excellent quality.

Esopus	Kaighn	Mother
Flushing	Manchester	Red Canada
Jonathan		

Summer Rose Group

Small, brightly colored summer apples; delicately flavored, excellent for dessert. Trees lacking vigor.

Piper's Best	Summer Rose	White Juneating
Sandbrook		

Sweet Bough Group

Summer or fall apples; sweet, medium to large in size; variable form; good quality.

Autumn Bough	Broadwell Sweet	Sweet Bough
Fullerton Sweet		

Tompkins King Group

Large, attractively colored, round-oblate; of good to excellent quality.

Blenheim	Pease	Utters Red
Fishkill	Ribston	Western Wonder
Hubbardston	Richards Graft	Westfield
Palouse	(Tompkins) King	

Twenty Ounce Group

Large to very large, round; sometimes brightly colored, with coarse-textured yellow flesh of good quality.

Collamer	Lyscom	Twenty Ounce
Hitchings		

Winesap Group

Small to above medium size; dark, often dull red coloring; firm but fine-grained flesh; good to excellent quality; season early to late winter. Seedlings often reproduce group characteristics. Mottled coloring and distinctly " five-furrowed " apex and basin.

Arkansas (M.B. Twig)	Heiges	Paragon
Arkansas Black	King David	Stayman Winesap
Delicious	Kinnard	Via
Dinwiddie	Magnet	Winesap

Yellow Bellflower Group

Medium to large; characteristically oblong conic. Yellow, with more or less blush and with a characteristic large open core. Flesh crisp, aromatic, acid to mild subacid.

Barry	Mason Orange	Ortley
Celestia	Moyer	Summer Bellflower
Flory	Newman	Titus Pippin
Kirkland	Occident	Yellow Bellflower
Malinda		

Yellow Transparent Group

Early summer varieties; medium size; with thin skin and tender flesh. Russian origin. Adaptation general.

Breskovka	Recumbent	Thaler
Moscow	Red Transparent	Yellow Transparent

The Crab-apple. — Our cultivated crab-apples are mainly of Russian origin (*Pyrus baccata*), although the term is sometimes used to designate any small apple. Most of our cultivated varieties, like Hyslop and Martha, are the result of crosses between the Siberian crab-apple and our common

apple (*Pyrus baccata* × *malus*). Some of the crab-apples of the southwestern United States originated as crosses of our native species of crab-apple on the apple. The crab-apple differs from the apple in both fruit and plant characters, the fruit being especially prized for culinary uses. The trees are usually more resistant to cold than apple trees. The bright, shiny foliage and the highly colored fruit make the crab-apple tree an attractive plant about the home. Native species of crab-apples are indigenous to most parts of the United States, and some are prized as ornamentals.

The Pear. — The fruit of the pear is more highly prized in Belgium and Japan than it is in America. We have been slow to develop varieties adapted to our conditions. The ravages of fire blight have greatly handicapped the pear industry. *Pyrus communis*, our garden pear, is supposed to have originated in about the same region as the apple. The first variety list was compiled by Cato, more than one hundred and fifty years before the Christian era.

The Chinese Sand Pear. — Chinese sand pears are noted for the grit cells in their flesh. They are somewhat resistant to fire blight and have been hybridized with *Pyrus communis* to develop blight-resistant varieties. Kieffer, Le Conte, Garber, and Pineapple are hybrid varieties cultivated in the southern part of the United States. The pure Chinese sand pears have not proven popular in this country because of their fruit characters. Even the hybrid varieties are prized more for cooking and canning than as a dessert fruit.

Natural Classification of Pears. — In common practice, pear varieties are usually divided into the three groups mentioned above. Waugh[1] proposed an arbitrary grouping based on form, season of ripening, and color, but it has not come into common use. Our nursery catalogues of to-day make a natural grouping of pear varieties, dividing them into two groups: European pears, and Chinese sand pear hybrids. This grouping is quite distinct and very useful,

[1] Waugh, F. A., "Systematic Pomology," pp. 172–174, 1903.

since methods of growing and handling the fruit are quite constant for each group. The latter group will withstand more heat than the former.

EXERCISES

Mark the following statements true or false. If any part of the statement is false, mark the entire statement false.

1. Baldwin and Roxbury Russet have " saucer-shaped " leaves.
2. Artificial classifications divide varieties according to one character at a time.
3. The Winesap group of apples is noted for pollination troubles.
4. Pomaceous fruits include quinces, pears, and apples.
5. Cross section, form, and color are the most constant characters of apples.
6. Leaves at the tip of the current season's growth are more alike, for a given variety of apples, than leaves on other parts of the tree.
7. Leaves of Rhode Island (Greening) have dull serrations.
8. The Fameuse group of apples is noted for high quality and thick skin.
9. The Spitzenburg group includes the variety Jonathan.
10. Varieties of the Winesap group have a marked tendency to be pentagonal in cross section.
11. The Chinese group of pears is noted for grit cells in the flesh of the fruit.
12. Varieties of European pears tend to withstand more heat than Chinese hybrid varieties.

CHAPTER VI

FRUIT STUDY OF PLUM VARIETIES

The best time to study the fruits of our different plums is when they ripen in the orchard. Stored specimens, even if they have been kept well below freezing, are hardly representative of the early varieties. It should also be borne in mind that the requirements of the prune industry are somewhat different from those of the fresh fruit market.

Size. — The varieties grown in almost any section differ greatly in size of fruit. Wickson and Pond are among our largest-fruited forms, often exceeding two inches through their longest diameter. Wayland will average a little over one inch in diameter, and many of the Damson plums run even smaller.

Forms of Plums. — The shapes or forms of plums are quite distinctive. Many consider shape, color, and taste the most important characters to use in recognizing varieties. These are also important characters from a selling point of view. Wickson is quite cordate, or heart-shaped. The pointed apex and cordate form of this variety act almost like a trademark. "Prune shape" is another common form, and is illustrated by Italian and Hungarian Prunes. The varieties described as prune-shaped are oblong or oval, and often somewhat necked, with compressed sides, usually swollen on the suture side of the fruit. The round varieties are also very common, although not quite as numerous as the prune-shaped ones. Bavay, Burbank, and Wayland are common varieties that approach the round form.

Cavity. — Most plums approaching prune shape have a rather small, often abrupt, narrow cavity. This is illustrated by Italian Prune and Lombard. Many of the varieties that tend to be roundish in shape have a cavity that

is wide and deep, similar to that of apples. Burbank, Monarch, and Wickson have deep, abrupt cavities. Wild Goose has an abrupt, narrow, shallow cavity.

Stem. — The stem is a good distinguishing mark among plum varieties, but the fruit is usually picked without stems. Even when not separated from the fruit in picking, the

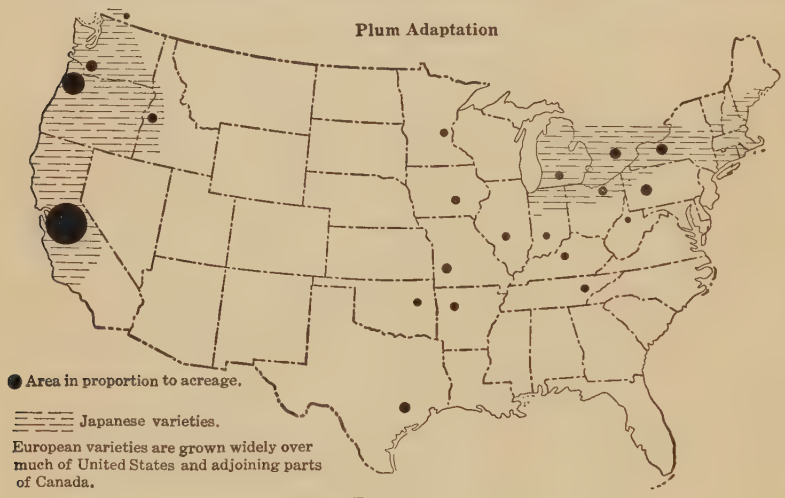

Plum Adaptation
Area in proportion to acreage.
Japanese varieties.
European varieties are grown widely over much of United States and adjoining parts of Canada.

FIG. 34.

stem is likely to drop off. Hungarian Prune has a long, slender stem, usually over one inch long. Both Burbank and Wickson have short, thick stems (less than three-fourths of an inch long). Wild Goose has a very slender stem, attached to a short growth, which gives it a jointed appearance. Italian Prune has a stem of medium length and thickness, which is inserted at one side of the base of the fruit. Satsuma has a stem that is less than one-half inch long.

Suture and Apex. — The grooves running lengthwise of plums and other stone fruits mark a natural division, or place where the fruit will split readily (suture). If we assume that the plum, both seed and flesh, developed from a folded leaf, then the suture may represent the junction of the leaf edges. The sutures of plums are often rather shal-

low. We find the suture deep and abrupt in Wickson, a mere line in Lombard, and about medium in Italian Prune.

Stone fruits do not have a basin as in apples and pears. The corresponding part is called the apex. This is best illustrated by Wickson, where the apex is prolonged and very prominent. Many varieties have a blunt apex, like Italian Prune. Some have almost no apex (roundish) as Bavay, while the variety Apple has a depressed apex.

Color and Bloom. — Our native and Japanese plums are noted for their bright colors, almost all shades of yellow and red being represented among them. Damson plums are usually blue or blue-black, and European varieties are usually yellow or blue. French (damson) is a good illustration of dull black after the bloom is rubbed off. Wild Goose is a bright red with a thin bloom. Wickson is a dark, greenish red, often mottled. Bradshaw is purplish red, while Bavay changes from greenish yellow to straw yellow as it ripens. As a rule, the buying public prefers a blue or purplish color in plums. The attitude of the public may undergo a change, but until this happens, most people will prefer blue color in plums and prunes.

Skin. — In prune production, the fruit is often dipped in lye to check the skin and thus hasten evaporation of the moisture in the fruit. At times the fruit is cured without dipping. Thickness of skin is thus an important character in prunes, as well as in plums sold in the fresh state. The skin of Bradshaw and Burbank is considered thin, and that of Yellow Egg is somewhat astringent. Wickson has a thin tender skin which separates readily from the flesh. The skin of Wayland is thick and tough. This is often true of many of our native plums.

Flesh. — An ideal prune has a golden-yellow flesh. Yellow is a standard color for flesh, both of plums and peaches. Italian Prune and Burbank have yellow flesh. Satsuma has a blood-red flesh which is very striking. Many varieties have greenish or greenish yellow flesh. French (damson) is a good illustration of greenish flesh.

Texture of flesh is always an important character of a fruit. The flesh of most varieties of plums is more or less fibrous. Bavay has a tender, and only slightly fibrous flesh. Pond is almost the other extreme, with firm fibrous flesh. That of Wickson is rather coarse.

Plums, like peaches, vary from those which separate readily from the pit to varieties having flesh that clings to the seed. The Italian Prune is about as freestone as any variety of plums. Yellow Egg is a semi-freestone. Both Grand Duke and Monarch are clings. Good commercial varieties of peaches (except for canning) should be freestones. This is not so true with plums, and comparatively few of our plum varieties are really freestone.

Flavor and Quality. — Sugar content, and flavoring are important characters. Italian Prune is subacid and somewhat aromatic. Agen runs high in sugar and makes a high-grade prune. Pond and Lombard lack flavor, although about average in sweetness. Most varieties of Damson are rather tart; French is perhaps as sweet as any of that group.

Stone, or Pit. — The characters of the stone of plums are often used in recognizing varieties. Hungarian Prune has a long, pointed stone. Shipper has a blunt, oval stone, winged on both edges or sutures. Monarch has a rough, pitted stone.

Season of Ripening. — This is always important where fruit is handled and sold in the fresh state. Bradshaw is perhaps the earliest important variety of the European plums. Monarch and Grand Duke ripen late. Wayland is a late-ripening variety of our native plums. Both Red June and Burbank ripen early, usually about August, in our northern sections.

FRUIT NOTES ON VARIETIES OF PLUMS

Japanese Plum Varieties

Good Points	*Bad Points*

Abundance

Origin: Japan.

Attractive.	Keeps and ships poorly.
Good tree characters.	Susceptible to brown rot.
	Ripens unevenly.
	Only medium quality

A good variety of the Japanese type for home plantings.

Burbank

Origin: From seed shipped to Luther Burbank from Japan.

Bright, attractive color.	Little more than medium in quality.
Keeps and ships well for a "Jap" plum.	

The leading commercial variety of this type in eastern North America. Overplanted in some sections.

Red June

Origin: Japan.

Bright, attractive fruit.	Small size of fruit.
Handles well.	Low quality.
Comparatively free from insects and diseases.	
Early ripening.	

Often planted commercially with Burbank to secure cross-pollination.

Satsuma

Origin: From seed received by Luther Burbank from Japan.

High quality.	Often only medium in appearance.
Handles well.	
Deep red flesh.	

Grown to some extent in home plantings in eastern United States.

Good Points *Bad Points*

WICKSON

Origin: In California by Luther Burbank.

Very large size.	Fruit ripens unevenly.
Attractive color.	
Good keeper and shipper.	

Probably the leading variety of "Jap" plums of the Pacific Coast. Often found on the fresh fruit markets of the eastern United States.

EUROPEAN PLUM VARIETIES

BRADSHAW

Origin: Unknown.

A large, attractive blue plum.	Fruit susceptible to brown rot.
Early ripening.	Only medium in quality.
Keeps and handles well.	

Probably the most commonly grown plum in the eastern United States and adjoining parts of Canada.

ARCH DUKE

Origin: England.

Quite attractive.	Sometimes small.
Handles well.	
Good quality.	
Freestone.	

A leading variety for the fresh fruit market.

BAVAY

Origin: Belgium.

High dessert quality.	A yellow plum.
High culinary quality.	
Keeps and ships well.	

Popular in home plantings. Sometimes sold under the name *Reine Claude.*

Good Points	*Bad Points*

Grand Duke

Origin: By Thomas Rivers of Sawbridgeworth, England.

Attractive prune shape.	Only medium dessert quality.
Good size.	
Good culinary quality.	
Handles well.	
Ripens late.	

A good market variety.

Italian Prune

Origin: Italy.

High quality, both dessert and culinary.	Somewhat acid as a dessert plum.
A long keeper.	
Handles well.	
Well-known.	

The leading variety of prunes of the Pacific Coast. This variety also ranks high as a market plum on eastern markets.

Lombard

Origin: Probably Holland.

Attractive fruit, although reddish in color.	Poor dessert quality.
Good culinary quality.	
Easy to grow.	

Widely grown, and low in market price. Although Lombard is a leading market and home variety, it would seem better business to grow higher-quality varieties for the fresh fruit market. A leading variety for canning.

Monarch

Origin: England.

Large, nearly round, rich purple fruit.	Rather weak in tree characters.
Good quality.	
Handles well.	

A good late-ripening variety for commercial and home plantings.

Good Points	*Bad Points*

POND

Origin: England.

Large size.	Poor quality.
Attractive reddish blue color.	
Keeps and handles well.	

Of doubtful value. Known on the Pacific coast as Hungarian Prune.

YELLOW EGG

Origin: Probably European.

Attractive yellow color.	Poor dessert quality.
Keeps and handles well.	Only medium culinary quality.
Good-sized fruit.	

Widely grown, but low in quality.

DAMSON PLUM VARIETIES

FRENCH

Origin: European.

Large size for a plum of this group.	Large seed.
Good culinary quality.	Not generally known.
Ships and handles well.	

Increasing in popularity both for commercial and home plantings.

SHROPSHIRE

Origin: England.

High culinary quality.	Hardly as good fruit characters as French.
Ships and handles well.	
Medium size for a Damson plum.	
Well-known.	

An old and well-known variety both for home and commercial plantings.

NATIVE PLUM VARIETIES

DE SOTO

Origin: Wisconsin.

High quality.	Medium size.
Keeps and ships well.	
Attractive fruit.	

One of the best of our native plum varieties.

Good Points	*Bad Points*

WAYLAND

Origin: Kentucky.

High culinary value.	Small size.
Late ripening.	Not a dessert plum.
Good keeper and shipper.	

A valuable variety in the South and Middle West.

WILD GOOSE

Origin: Tennessee.

Attractive both in size and color.	Requires cross-pollination.
Good dessert quality.	Inclined to ripen unevenly.
Ships and keeps well.	
Comparatively free from pests.	
Widely known.	

Perhaps the most widely known of our native plums. It is especially common in home plantings.

EXERCISES

Fill in the blanks correctly. You may be graded on your selection of words used in filling in the blanks.

1. The leading variety of plums of the Pacific Coast is ....., which is also an important variety in Massachusetts.
2. Japanese varieties of plums are not grown in central Ohio because of .....
3. Japanese varieties of plums are ..... subject to black knot than European varieties.
4. ..... is the largest-fruited variety of Japanese plums in common cultivation.
5. ..... is the largest-fruited variety of Damson plums in common cultivation.
6. ..... is so poor in dessert quality and so widely grown that it is called the "Ben Davis" of European plum varieties.
7. ..... is a rather small, cordate-shaped plum of the Japanese group.
8. ..... is a small, bright red, firm-fleshed, acid plum of our native plum group.
9. ..... has a peculiar double-jointed stem which helps to distinguish it from other varieties of native plums.
10. Wickson has a ..... suture and is ..... in shape.

CHAPTER VII

PLANT STUDIES OF PLUMS AND GRAPES

Tree studies of plums are very interesting because the trees vary so much. Thus, Burbank is inclined to spread more than is desirable, while Shropshire Damson illustrates the opposite extreme. Satsuma is not a very strong grower, while Yellow Egg makes a good growth. Before proceeding with the study of this chapter, the student should

FIG. 35.

Upper: Japanese plum (variety Burbank). Blossoms are produced profusely, and open very early in the spring.

Middle: Native plum (variety Wayland). The shoots are slender. The buds resemble those of the peach, except for the spur development.

Lower: European plum (variety Bradshaw). Axillary buds usually occur singly, occasionally in groups of two. These buds are very pointed when compared with those of Japanese and native plums.

describe the differences in appearance between the groups of plums listed in the chapter on classification. Hortulana and many others of our native plums have some resemblance to the peach, both in bark and foliage. Time of blossoming is a very distinctive character in plums and one that is

important in plum production. The Burbank and other Japanese plums blossom extremely early and require the maximum protection from late spring frosts. This is so important that Japanese plums are not grown in some parts of our country. They are grown more than all other kinds in New England, which is comparatively free from spring frosts after fruit trees are in bloom. Our native plums often blossom after the other plum blossoms have faded. This makes them especially desirable for frosty locations.

Prunes are an important class of plums. Their chief characteristics are " prune shape " and high sugar content. Then we might contrast the bark and foliage of Arch Duke and Washington. The former has small leaves and dark reddish bark; the latter quite the opposite. Freedom from brown rot is very striking and of great importance to the grower. Certain groups are very susceptible. Damson, Monarch and our native plum varieties are comparatively free from this disease.

ORCHARD NOTES ON PLUM VARIETIES

Good Points	*Bad Points*
Abundance	
Heavy bearer.	Susceptible to shot-hole fungus.
Regular bearer.	Said to include several strains.
Adapted to many kinds of soil.	Drops fruit badly.
	Blossoms early.

This Japanese plum has been very popular. It is losing ground as a commercial variety, largely because of fruit characters.

Burbank	
Very heavy producer.	Requires thinning.
Vigorous grower.	Requires cross-pollination.
Adapted to many kinds of soil.	Blossoms very early.
	Extreme spreading habits of growth and brittle wood.

The leading commercial variety of " Jap " plums in New England. Its tree characters are hardly as good as those of Abundance.

Good Points	*Bad Points*
Red June	
Early season of ripening. Vigorous and hardy. Productive. Blossoms late for a Japanese plum.	Variable in season of ripening.

Often planted with other Japanese plums to insure cross-pollination.

Fig. 36. — Burbank variety of Japanese plums. The extreme spreading habits of growth, and the large, glossy, dark green foliage of this variety make a striking tree compared with native and European varieties of plums.

Wickson	
Mostly fruit characters, at least in Eastern sections.	Blossoms early. Tender to cold. Narrow, upright tree.

Probably the leading Japanese plum variety in California. It seems to be a failure in the eastern United States. Considerable quantities of this variety are being shipped to markets in the eastern states.

Good Points	*Bad Points*

BRADSHAW

Early season of ripening.	Subject to shot-hole fungus and other plum diseases.
Well-formed trees.	
Heavy bearer.	Slow in coming into bearing.
Hardy.	

A popular, early-ripening variety of European plums. The tree characters are generally considered good.

FIG. 37. — Italian Prune tree — Bay Road Fruit Farm, Amherst, Mass. This is the leading variety of plums of the Pacific Coast, and a popular variety on the Atlantic Coast.

ITALIAN PRUNE (*Fellenberg*)

Usually large and well-formed trees.	Not adapted to some soils and locations.
Productive and a regular bearer.	Suffers from dry, hot weather.
At least medium hardy to cold.	

A popular plum both in Europe and America. Where it fails, the trouble is due to tree characters.

Good Points	*Bad Points*

GRAND DUKE

Very heavy producer.	Poor nursery tree.
Hardy to cold.	Slow in coming into bearing.
Usually healthy.	

This variety has gained rapidly in popularity, while only medium in tree characters. Production and health, combined with good marketing characters of the fruit, commend it.

LOMBARD

Very widely adapted.	The failings of this variety are almost entirely fruit characters.
Very productive and regular in bearing.	
Healthy tree.	

Lombard has almost ideal tree characters. This fact, combined with the " good looks " of the fruit, has made the variety well-known.

MONARCH

Good bearer.	Only medium in vigor and health.
Well-formed tree.	

Not more than average in tree characters.

SHROPSHIRE (*Damson*)

Large and vigorous for a Damson plum.	Foliage subject to shot-hole fungus.
Healthy and hardy to cold.	
A standard in production.	
Well-formed tree.	

The splendid tree characters of this variety have greatly helped to make it the best-known of the Damson plums.

FRENCH (*Damson*)

Well-formed trees.	Not well-known.
Productive and regular bearer.	
Large, healthy trees.	

A very promising variety of the Damson group.

VINEYARD STUDY

We shall now consider a very different kind of fruit, the grape. We have all noticed differences in grape vines, but few of us have ever made a study of the characters in which they differ. Concord, Brighton, and Niagara are all strong growers. Moore and Eaton tend to make a weaker growth and a smaller vine. Some of our riparia, or southern river-bank grapes, require twice as much space as that required by

FIG. 38. — Variety Worden. A good illustration of the labrusca type of grape both in vine and fruit. This is a popular variety of blue grapes where the season is as short as it is in New England and Ontario.

Concord. Most grapes grown in Europe have *Vitis riparia* roots. Our northern grapes are of three colors: blue or black, red, and green or white. It will be noted that the green grapes have light-colored shoots and leaves, while the dark-colored grapes have darker shoots and foliage. As a rule, vinifera vines tend to grow stocky, although this tendency is more pronounced in some varieties than in others. In our southern states, we have another kind of grape, called rotundi-

folia, which makes a very large growth. The berries are large and there are only a few in a cluster. The amount and habits of growth are very striking characters among grapes, and have a decided effect on methods of planting, training and caring for any given grape plant.

Foliage and Shoot Characters. — The shape of the leaves and the thickness of the shoots differ somewhat among our varieties of native grapes. Delaware and Green Mountain

Courtesy H. E. Jacob.

Fig. 39. — Variety Ohanez. A grape of the vinifera group common on our markets about Christmas.
Compare this specimen of vinifera grape vine with that shown in Figure 38.

(Winchell) have slender shoots with small, deeply lobed leaves. Concord and Moore have large leaves and thick shoots. Concord has a tendril opposite almost every leaf, except near the base of the shoot. Continuous tendrils are a good identification character of labrusca grapes. Delaware frequently has every third node bare except for a bud and a leaf. Intermittent tendrils are common among other species of grapes

except labrusca. Most grape canes of the current season have the pith interrupted by more or less wood (diaphragm) at the nodes. The diaphragm of all labrusca varieties is thick; in riparia (*V. vulpina*) it is thin; and in rotundifolia it is absent. The number of blossom clusters and the time of blooming are also used to identify grape species.

VINEYARD NOTES ON GRAPE VARIETIES

Good Points	*Bad Points*
Delaware	
Hardy to cold.	Requires fertile soil.
Free from black rot.	Small-sized vine.
	Mildews badly.

Fig. 40.

Upper: Continuous tendrils.

Lower: Intermittent tendrils. This is one of the best distinguishing marks between our fox grapes, Vitis labrusca (including varieties like Concord, Worden and Moore Early) and other kinds of grapes.

Worden	
Adapted to short seasons of New England.	Does poorly on some sites.
Heavy producer.	

Good Points	*Bad Points*
Moore (*Early*)	
Short season to mature.	Only medium producer.
Hardy to cold.	Rather weak grower.

Courtesy H. E. Jacob.

Fig. 41. — A young Sultanina (Thompson Seedless) vineyard. This variety is the leading raisin and table grape of the Pacific Coast.

Brighton	
Productive.	Requires cross-pollination.
Vigorous grower.	
Niagara	
Heavy producer.	Susceptible to black rot.
Strong grower.	Less hardy to cold than Concord.
Winchell (*Green Mountain*)	
Hardy to cold.	Crop sometimes ripens unevenly.
Vigorous grower.	
Good producer.	
Concord	
Grows well on most soils.	Troubled by phylloxera and chlorosis.
Heavy producer.	Needs rich, virgin soil.
Blossoms late.	Fails to mature in much of New England and similar sections.
Catawba	
Adapted to wide range of soils.	Late-maturing for many sections.
Productive.	Susceptible to fungous diseases.

Courtesy H. E. Jacob.

FIG. 42. — Large vines of Tokay. Tokays are the common reddish vinifera grapes found on our markets during autumn. This variety ranks among the first three vinifera table grape varieties.

FIG. 43. — A labrusca (Worden) vineyard in winter. This species of grapes is adapted to the southeastern, southwestern parts of Canada and a large part of northern United States.

QUESTIONS

1. Compare our four groups of plums: native, damson, Japanese, and European, as to shoot and bud characters.
2. Which of the above groups of plums tend to be very upright in habits of growth?
3. Compare Moore and Campbell grapes as to vine characters.
4. How does the period of development (blossoming to maturity) of labrusca varieties compare with that of vinifera varieties?
5. Compare the vine characters of Concord with those of Delaware.
6. What do you consider the heaviest-producing variety of grapes in your section? Give reasons for your answer.

REFERENCE READINGS

Bailey, L. H., "The Standard Cyclopedia of Horticulture," Volume V, pp. 2822–2844, Volume VI, pp. 3481–3492, 1915.

"Descriptive Catalogue of California Grapes," California Department of Agriculture, Special Publication No. 25, 1922.

CHAPTER VIII

STUDY OF PEACH VARIETIES

The peach is one of the most perishable of our tree fruits. The fruit quickly loses flavor and deteriorates in storage This limits our fall and winter class supplies of material for the study of peaches to colored plates, canned specimens, and a few late-ripening varieties. The ideal time to study the fresh fruit is when it has just ripened on the tree. Plant characters may be studied from the trees in the fall, and blossoms may be studied from forced shoots.

FIG. 44. — Stamens of a (J. H.) Hale peach blossom on left, compared with those of Elberta on the right. The (J. H.) Hale variety has pollination troubles. This picture was taken just as the blossoms were opening. The petals and sepals were removed to show the stamens.

Nectarine. — We are all familiar with the pubescence, or "fuzz," on the peach. This material affects the appearance of the fruit, and often causes irritation of the skin of workmen engaged in harvesting and handling the crop. It seems

strange that the American people should prefer the peach, with all its pubescence, to the nectarine. The nectarine has most of the characters of the peach, practically the same range in climate, and in addition, is free from pubescence. The nectarine is more prized in England than in this country. Most of our available varieties came from England. Some varieties are sufficiently hardy to grow in New England, and a few specimens will add interest to our study of peach varieties.

THE PEACH

Peach Sizes. — Most markets demand that the fruit approximate a certain size and will discount for extremes in either direction. (J. H.) Hale is about as large a peach as most markets want. Some growers even find this variety running too large. The greatest defect of Gold Drop is its small size; a good-sized specimen of this variety is about two and one-half inches in diameter. (J. H.) Hale is often more than three inches in diameter. Perhaps the medium size among commercial varieties of peaches is about two and three-fourths inches in diameter.

Peach Shapes. — In walking through any large market in the northern part of the United States, we sometimes find the same variety of peaches grown in various parts of our country. We find that a Texas Elberta is flatter, more oblong, and more beaked than a Massachusetts Elberta. It is necessary to keep this in mind in noting the shapes of varieties of peaches. Champion and (J. H.) Hale are round, or nearly round. Greensboro is oblong oval. Some varieties, like Niagara, are inclined to be cordate in form. The most important varieties of to-day tend to be round.

While the size and shape of the beak vary considerably, they are used in the identification of varieties. Late Crawford has a roundish apex with a slightly swollen beak. Elberta usually has a pointed, or mamelon, beak. Some varieties have almost no beak, while Champion has a recurved, mucronate beak.

The sides of stone fruits are often compressed, giving the fruit a flattish appearance. This is more or less characteristic of fruit grown in certain sections, rather than of varieties, but it may be observed in Salway. Salway also has uneven sides, as have many varieties of apples. Champion and (J. H.) Hale have even sides.

Suture and Cavity. — The suture is quite prominent in most peach varieties. It is deep in St. John and a mere line in (J. H.) Hale.

The cavity of peaches varies quite as much as among apples. Greensboro has a deep, abrupt, narrow cavity, while (J. H.) Hale has a wide, flaring cavity. The cavity of Fitzgerald is often marked by radiating streaks.

Color. — It has often been said that the American public buys fruit with the eye. Certainly, color and appearance are an important factor with the buyer. As a rule, the flesh color is similar to the under-color in peaches. Thus, white-fleshed peaches have a more or less whitish under-color. Most markets demand yellow-fleshed peaches in preference to white or red. The over-color is usually some shade of red and may be blushed, streaked, or splashed. Carman, a white-fleshed peach, has a creamy white under-color, overspread with light to dark red. The amount of pigment differs among varieties. Early Crawford is more yellow than Elberta, although both are yellow-fleshed peaches. One of the whitest of the white is Summer Snow.

Skin and Pubescence. — Pubescence varies among varieties, in amount, length, and fineness. Greensboro has a very coarse pubescence, while that of Niagara is fine. The pubescence of Carman is composed of very short hairs, while in Fitzgerald the hairs are comparatively long.

The skin of many of our commercial varieties of peaches is fairly tough, but it varies in thickness The skin of Carman is quite thin, while that of Elberta is quite thick.

Flesh. — Next to size and appearance, flesh characters are most important from the grower's point of view. Flesh color has already been mentioned. The author has frequently

found fancy, white-fleshed peaches selling at the same price as cull, yellow-fleshed varieties. Almost equally strong is the market demand for freestone, rather than cling varieties. We can divide peach varieties into freestone, cling, and half-freestone groups; that is, they grade from very free to markedly cling. The flesh of Salway parts readily from the seed; Greensboro is not more than half-freestone; while Heath Cling is an old variety of the clingstone group.

Texture of flesh is quite important commercially. For dessert purposes, a tender flesh is preferred. Carman has a tender flesh, but is rather soft, while the flesh of Late Crawford is both firm and tender. Elberta is considered a good canning variety because of its stringy texture.

Stones of Peaches. — The pits, or stones, of peaches have many characters that might be studied with profit if time permitted. They vary in size, shape, amount of wing, grooves, and depressions. However, it is necessary to pass on to the consideration of other characters.

Flavor and Quality. — The peach responds quickly to favorable or unfavorable environment, which often produces a noticeable change in flavor and quality. The amount of acidity and sweetness varies considerably. Fitzgerald is mildly subacid; Late Crawford is somewhat sweeter. Both are well-flavored and considered very good in quality. Greensboro is mild in flavor and only fair in quality.

Tree Characters. — Almost everyone has noticed that peach blossoms differ in color and size, varying from pink to white and from small to large. Hedrick considers these differences to be of some taxonomic value. Perhaps, from the grower's point of view, resistance to cold is most important. In New England, the embryo blossoms are often killed in the bud by low temperatures in midwinter. Somewhat different conditions may cause killing of branches or even of the entire tree. The peach blossoms early in the spring. In many sections, the embryo fruit is killed by cold after the blossom opens. Bud-hardiness may be due to several factors. Some varieties start growth quickly during a warm period in

midwinter. This may be followed by bud injury. We find Greensboro quite bud-hardy in New England, but it starts easily during a warm period and may then be less hardy than some other varieties. Gold Drop is very hardy in bud and tree. Elberta is usually considered somewhat bud-tender.

Resistance to Disease. — Brown rot is very destructive to peaches, as it is to plums. It develops not only in the orchard, but enroute to market, and up to the time that the fruit is actually used. Freedom from this disease is a very desirable character. Gold Drop is about as free from brown rot as any variety. Champion is quite subject to the disease.

Foliage Characters. — It is interesting to try to identify a few standard varieties from nursery trees. This is done by examining the leaves toward the middle of the current season's growth, as in the case of apples. If a leaf of Carman is compared with one of Elberta, it will be seen that the Elberta leaf shows a yellowish hue, especially if the sun is bright, and that the Carman leaf lacks this yellow hue. By this means, it is possible to tell whether a given tree will have yellow-fleshed or white-fleshed fruit. Toward the base of the leaf are some enlargements called glands. This is also true of plum and cherry leaves. Varieties like Early Crawford, Mountain Rose, St. John, and Fitzgerald have round or globose glands. Varieties like Elberta, Smock, Greensboro, Carman, and Belle (of Georgia) have reniform or kidney-shaped glands. It is well to look at several leaves on a given tree, as the first leaf at which one happens to look may be an exception to the rule.

After the leaves have been examined for yellow pigment and glands, their form and size should be examined. Elberta has a long, broad leaf that is leather-like in texture. Some leaves are crinkled, like those of Fitzgerald. St. John has a flat leaf. The midrib of some is curved toward the under side, while others are straight. Fitzgerald has a recurved leaf.

Peach Adaptation. — The Elberta peach is grown in nearly every commercial peach-producing section. Somewhere in the United States, this variety is ripening from about July

4th to October 1st. In California, Muir and Lovell are grown especially for drying. In the peach-canning sections of California, cling varieties are preferred. In Florida and Texas, we find other varieties that are adapted to the hot climate of those states. In most sections, Elberta is the leading variety and often represents the larger part of the crop.

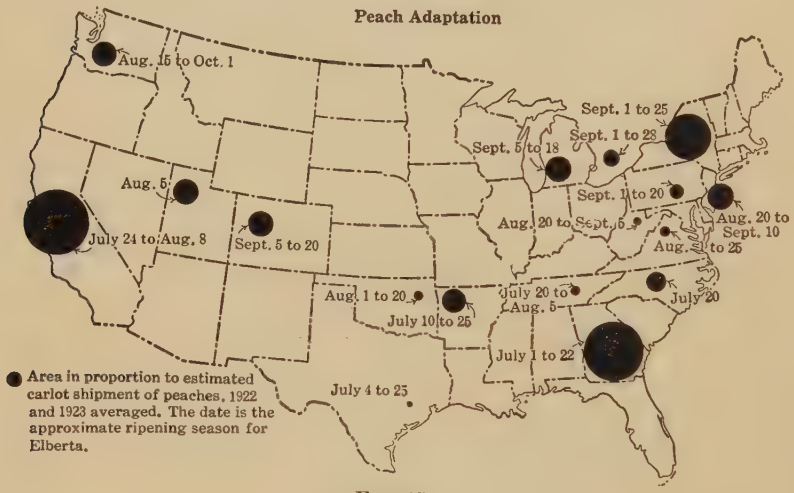

Peach Adaptation
Aug. 15 to Oct. 1
Aug. 5
July 24 to Aug. 8
Sept. 5 to 20
Aug. 1 to 20
July 10 to 25
July 4 to 25
July 1 to 22
July 20 to Aug. 5
July 20
Aug. 20 to Sept. 5
Sept. 1 to 20
Sept. 5 to 18
Sept. 1 to 28
Sept. 1 to 25
Aug. 20 to Sept. 10
Aug. 25
Area in proportion to estimated carlot shipment of peaches, 1922 and 1923 averaged. The date is the approximate ripening season for Elberta.

Fig. 45.

By comparing the outline map for peaches with that for other deciduous fruits, we find that winter temperatures limit the peach in the North; that spring frosts are a limiting factor in many sections like Ohio, Indiana and Illinois; and that the peach thrives somewhat farther South and in drier sections than do many other deciduous fruits.

Peach Variety Notes

Good Points	*Bad Points*
Belle (*of Georgia*)	
Origin: Georgia.	
Vigorous grower.	White-fleshed.
Productive.	Stringy texture of flesh.
Attractive fruit.	

A prominent variety among white-fleshed peaches.

Good Points	*Bad Points*

CARMAN

Origin: Texas.

Adapted to many soils and climates.	Slightly bitter flavor.
Best of its season in many sections.	White-fleshed.
Productive and hardy to cold.	
Comparatively free from brown rot.	

A leading early-ripening variety in many sections.

FIG. 46. — A thrifty row of Belle (of Georgia) peaches three years old. This is a good variety, but has white flesh.
The soil is little more than rocks and humus, called chert land.

CHAMPION

Origin: Illinois.

Standard of quality.	Very susceptible to brown rot.
Very productive.	Not adapted to all soils.
Vigorous growing trees.	White-fleshed.

A splendid home variety and grown commercially in some sections.

Good Points	*Bad Points*

CROSBY

Origin: Massachusetts.

Hardy.	Small-sized fruit and only medium in attractiveness.
High quality.	
Yellow flesh and a freestone.	Does poorly under adverse conditions.

A home variety where hardiness is an important factor.

EARLY CRAWFORD

Origin: New Jersey.

Standard of quality.	Unproductive.
Yellow-fleshed.	Not adapted to a great variety of soils.
Well-known.	

Rarely planted commercially.

ELBERTA

Origin: Georgia.

Adapted to many soils and climates.	Only medium to good in quality.
Very productive.	Bud-tender to cold.
Comparatively free from pests.	
Attractive fruit.	
Yellow-fleshed and a freestone.	
Good shipper.	

The leading commercial variety in America, and promises to continue to be so.

FITZGERALD

Origin: Ontario, Canada.

Claimed to be hardier to cold than Early Crawford.	Nearly the same failings as Early Crawford.
Claimed to be more productive than Early Crawford.	

Grown in the colder sections in preference to Early Crawford.

GREENSBORO

Origin: North Carolina

Bud-hardy to cold.	Poor quality.
Large, attractive fruit.	Cling and white-fleshed.
Ripens early.	

Grown in northern sections because of hardiness.

Good Points	*Bad Points*

HALE (*J. H. Hale*)

Origin: Connecticut.

Very large, almost too large.	Pollination troubles.
Very good shipper.	Not always productive.
Yellow-fleshed and a freestone.	
Very attractive.	

(J. H.) Hale is not being planted as much as formerly. Most varieties of peaches are self-fertile. The need of cross-pollination for (J. H.) Hale trees often results in variable production.

FIG. 47.

Upper: Native plum (variety Wayland) showing the bud arrangement. Axillary buds occur singly, in twos and in threes.

Lower: Peach (variety (J. H.) Hale) showing bud arrangement somewhat similar to the native plum above. The peach blossom bud contains but a single flower and does not develop spurs.

LATE CRAWFORD

Origin: New Jersey.

Practically the same notes as for Early Crawford. Niagara is another variety of the Crawford type. It is grown to some extent in New York.

Good Points	*Bad Points*
Muir	
Origin: California.	
High culinary quality.	Poor external appearance of fruit.
Productive trees.	
Yellow-fleshed.	

Grown especially for drying and canning on the Pacific Coast. California canned peaches are important competitors of eastern canned peaches, including fresh fruit sold for canning. Most of these varieties are clings and include Albright Cling, Nichols, Sellers, Phillips and Levy.

Salway	
Origin: England.	
Late-ripening.	Only good in appearance and quality.
Yellow-fleshed and freestone.	Ripens too late for northern sections.
Good canner.	
Very productive.	

Salway is popular both in Europe and America. It is used to extend the season in many sections.

THE APRICOT

The apricot can be grown throughout a large portion of the warmer sections of North America. Single trees are not uncommon in many parts of the eastern United States. Failure to mature fruit is usually due to spring frosts and the humid air. This fruit is quite susceptible to brown rot, and blossoms very early in the spring. Commercial production is limited to the western third of our country. California is the leading state in apricot production. The fruit is marketed as fresh, dry, and canned apricots.

SOME APRICOT VARIETY NOTES

Good Points	*Bad Points*
Blenheim	
Very heavy producer.	Susceptible to brown rot.
Good quality.	Often needs thinning of fruit.
Excellent for canning.	

Now ranking first in popularity for most purposes.

Good Points	*Bad Points*

MOORPARK

Origin: England.

Large fruit.
Makes a fancy dried product.
Very vigorous grower.

A shy bearer under some conditions.

Recommended for drying.

NEWCASTLE

Origin: California.

Early ripening.
High-colored fruit.
Good dessert quality.

Only medium size.

ROYAL

Origin: France.

Excellent for canning and drying.
Good quality.
Attractive fruit.

Formerly the leading variety for canning purposes.

TILTON

Origin: California.

Late bloomer.
Comparatively free from brown rot.
Good producer.

Colors before ripe.

Considered second in popularity.

QUESTIONS AND EXERCISES

1. What do you understand by canning quality in a variety of peaches?
2. Name several varieties of peaches that are bud-hardy to cold.
3. Name a variety of peaches with a comparatively short "rest period." A variety with a comparatively long rest period.
4. What variety of peaches has pollination troubles? Why?
5. Name a prominent variety of peaches that is very subject to brown rot.

6. Why are white-fleshed varieties of peaches handicapped commercially?

7. Is storage quality a factor in judging varieties of peaches?

8. What varieties of peaches grown in other sections compete with Elberta in your section?

9. How do you distinguish varieties of peaches by fruit characters?

10. Name a variety of peaches that is very large, nearly round, white-fleshed, a freestone, and ripens in early mid-season.

REFERENCES

Gould, H. P., "Growing Peaches: Varieties and Classification," United States Department of Agriculture, Farmers' Bulletin 633, 1915.

Hedrick, U. P., "The Peaches of New York," New York Agricultural Experiment Station, Report, Part II, 1916.

Johnston, Stanley, "An Analysis of the Peach Variety Question in Michigan," Michigan Agricultural Experiment Station, Special Bulletin 126, 1924.

CHAPTER IX

STUDY OF CHERRY VARIETIES

In comparing cherry varieties we find a number of interesting and important differences between them. The color varies from nearly yellow through red to black. The variety Wood is yellowish, overlaid with a small amount of crimson. Early Richmond is a bright red, while Bing is a very dark red and Black Tartarian is a purple black. There are also differences in the color of the juice. Thus, Napoleon, Wood, Early Richmond, Montmorency, and Dyehouse have colorless juice. Schmidt, English Morello, Bing, Republican, and Black Tartarian have colored juice.

Size of Cherries. — The cherry is not a large fruit. Few of our commercial varieties are larger than Napoleon, which averages one inch in diameter. Schmidt and Republican are also large varieties, averaging nearly as much. May Duke and Suda are small, averaging about three-fourths of an inch in diameter. Many of our wild forms are very small-fruited (less than one-fourth of an inch in diameter). Size is quite important. Few varieties will be grown commercially if the fruit is small. Slight variations in size make considerable difference in the cost of picking and seeding the fruit. This is one of the chief failings of Dyehouse when compared with Early Richmond, although Early Richmond is hardly as good a cherry in quality.

Cherry Shapes. — Along with sizes, it is well to note shapes. Cordate or heart-shaped varieties are quite common, including English Morello, Ox Heart, and Wood. Early Richmond and Montmorency are nearly round. Quite a few varieties are markedly oblate, as illustrated by Vladimir. The round and cordate forms are very desirable for cherries, and most of our more popular varieties at least approach either of these forms.

Cherry Stems. — Some varieties of cherries resemble each other very closely. Trees from Morello cherry seed are usually of a Morello type and closely resemble some of our cultivated varieties. Length of stem is sometimes the most striking difference. Montmorency (Ordinaire) has a stem one inch or more in length, while that of short-stemmed Montmorency is less than three-fourths of an inch long. May Duke and Late Duke have very long stems, nearly two inches long. Length of stem is chiefly an identification mark, although of some importance commercially. Short-stemmed varieties are a little harder to harvest. Cherries are usually picked with the stems attached. Very long stems detract from the appearance of the fruit in the package.

Suture Line and Skin. — The groove or division running lengthwise in stone fruit is called a suture or suture line. This is comparatively indistinct in some of our sour cherry varieties, but quite distinct in some of the sweet cherries, like Wood and Napoleon. The dots on cherries are not as distinct as those on apples. The tendency of the skin to crack is an especially important consideration in sweet cherries, and is one of the great weaknesses of the variety Wood, which has a tender skin.

Flesh Characters of Cherry Varieties. — At the present time, canners and shippers prefer firm-fleshed varieties. This preference is so marked that soft-fleshed varieties are rapidly being limited to home plantings and local markets. The flesh of cherries varies in firmness, some varieties being quite soft and juicy and others very firm. Windsor and Republican are firm-fleshed varieties; Black Tartarian and Early Richmond have a softer flesh. The flesh of a cherry is also characterized as tender or stringy, and as fine or coarse. These are important flesh characters from a commercial point of view. The flesh of Early Richmond is more stringy than that of Dyehouse. Montmorency is somewhat less juicy than Early Richmond. " Meaty " is a term applied to the flesh of such varieties as Napoleon and Bing.

Characters of Cherry Pits. — Cherries, like other stone fruits, vary from freestone to clingstone. The flesh of Napo-

leon is only partly free from the pit. Early Richmond and Montmorency are freestones, while Wood is classed among the clings. The pit is nearly smooth in most varieties, but varies somewhat in size and shape. Seed characters will be discussed more fully in connection with other stone fruits.

Flavor and Quality. — Few cherries are more acid than the English Morello, which, perhaps for this reason, is called the " pie " cherry. Our different varieties of Duke cherries vary from mildly sour to mildly sweet. Most of our leading commercial varieties of sweet cherries can be classed as mildly sweet. " Sprightly," a term commonly used to describe flavor among cherries, usually means " sufficiently acid to be refreshing." Perhaps some of the readers of this book have gathered wild, sweet cherries as they occur in Pennsylvania and Virginia, and have found that the fruit of such trees usually has a bitter and astringent taste. Most of our common varieties are comparatively free from this flavor. Arch Duke is slightly astringent, and will illustrate this character.

Brown Rot. — The cherry, like most stone fruits, is subject to brown rot. This is especially true of sweet cherries. From a commercial point of view, susceptibility to brown rot is a serious defect in any variety. Wood is one of our worst offenders in this respect, while Windsor is comparatively free from this disease.

Tree Characters. — Susceptibility to leaf spot is one of the failings of many varieties of the Morello type. It is not uncommon to see trees of the English Morello defoliated by this trouble in early fall. In New England, many sweet cherries fail to produce satisfactory crops because the embryo blossoms are killed by cold in midwinter. The sour cherries are much more bud-hardy. Windsor is considered especially hardy among sweet cherry varieties. While sour cherries can be grown on almost any soil, sweet cherries are much more particular. It is a common complaint that sweet cherries are short-lived on many sites in the eastern United States. Black Tartarian is grown in most sections because it is adapted to many soils and climates.

NOTES ON CHERRY VARIETIES

Sour Cherries

Good Points	*Bad Points*

Montmorency

Origin: Probably France.

Preferred by canners.	Less hardy than Early Richmond.
Healthy and productive.	Fruit only good in size, appearance and quality.
Adapted to many soils and climates.	
Has firm flesh and handles well.	
Comparatively free from brown rot.	

The leading commercial variety of sour cherries and popular in home plantings. Ripens in mid-season.

English Morello

Starts bearing early.	Susceptible to leaf spot.
Productive for size of tree (dwarf in size).	Too acid for a dessert fruit.
Hangs well after ripening.	Requires close planting.
High culinary quality.	

The leading commercial variety of late-ripening sour cherries. Resembles the variety Wragg very closely.

Early Richmond

Origin: Probably France.

Hardy to cold.	Only mediocre in quality.
A good cherry for canning.	
Widely adapted to soil and climate.	
Vigorous grower.	
Productive.	

The leading early sour cherry. Popular in both home and commercial plantings.

Dyehouse

Origin: Probably Kentucky.

Very early ripening.	Only medium in size.
Good quality for an early cherry.	Less productive than Early Richmond.
Bright, attractive fruit.	Not well-known.

A competitor of Early Richmond, but not nearly so well-known.

Duke Cherries

Good Points	*Bad Points*

May Duke

Well-known.	Ripens fruit over long period.
Widely adapted.	Tender flesh.
Very vigorous and productive.	
Healthy and hardy.	

Limited to home plantings and local markets.

Sweet Cherries

Black Tartarian

Thrives in many sections.	Not as productive as some varieties.
Comparatively free from brown rot.	Fruit is somewhat small in size.
Long-lived, vigorous tree.	A soft-fleshed cherry.
Well-known.	

Popular in home plantings over much of the eastern United States.

Napoleon

Large-sized and attractive fruit.	Seems poorly adapted to many sections in the eastern part of our country.
Well-known on markets.	
Very productive.	
High quality.	Fruit cracks during wet weather.
Ships and handles well.	Subject to brown rot.

Thrives especially well in the dry climate of the Pacific Northwest. Has no rival among the light-colored firm-fleshed sweet cherries. Called Royal Ann in some sections.

Windsor

Hardy to cold.	Slow coming into bearing.
Attractive dark color.	Very upright-growing trees.
Ships and handles well.	
Comparatively free from brown rot.	

A promising commercial variety for eastern sweet cherry sections.

Good Points	*Bad Points*

BING

Origin: By Seth Lewelling of Milwaukee, Oregon.

High quality.	Not well adapted to eastern North America.
Attractive dark color.	
Good shipper.	

A prominent variety in the Pacific Northwest.

REPUBLICAN

Origin: By Seth Lewelling of Milwaukee, Oregon.

High quality.	Not adapted to a great variety of soils.
Attractive color.	Variable in size of fruit.
	Subject to shot-hole fungus.

Grown in some sections. Not generally recommended for commercial plantings.

SCHMIDT

Origin: Germany.

Large and attractive fruit.	Colors before ripe.
Comparatively free from brown rot.	
High quality.	

Grown to a limited extent, although widely planted.

QUESTIONS

1. Why are Duke cherries (such as May Duke) grown principally in home plantings?
2. Name some of the failings of Wood as a commercial variety of sweet cherries.
3. How do you account for the popularity of Napoleon as a fresh fruit?
4. Name three varieties of cherries having clear juice and three having colored juice.
5. Name two of our more hardy (to cold) varieties of sweet cherries.

6. Name two of the more important failings of English Morello cherries.

7. What is the leading canning sour cherry of North America?

REFERENCE READINGS

GOULD, H. P., "Growing Cherries East of the Rocky Mountains," United States Department of Agriculture, Farmers' Bulletin 776, 1916.

HEDRICK, U. P., "The Cherries of New York," 1915.

CHAPTER X

CLASSIFICATION OF DRUPACEOUS OR STONE FRUITS

Drupaceous or stone fruits include peaches, plums, cherries, apricots, nectarines, and almonds. The almond is usually grouped with nut fruits, but the tree and its habits of growth resemble those of the stone fruits. The following list includes the more common species of this group of fruits:

Courtesy Frank A. Waugh.

FIG. 48. — Chicasaw plum (Prunus angustifolia), wild in the woods of western South Carolina.

Drupaceous Fruits

Plums:

1. Common plum, *Prunus domestica*, Linn.
2. Damson plum, *Prunus institia*, Linn.
3. Japanese plums, *Prunus salicina*, Lindl.
4. Native plums of America:

a. Beach plums, *Prunus maritima,* Marsh.
b. Common wild plums, *Prunus Americana,* Marsh.
c. Canada plum, *Prunus nigra,* Ait.
d. Wild Goose plums, *Prunus Munsoniana,* Wright and Hedr.
e. Hortulana plums, *Prunus hortulana,* Bailey.

Cherries:

1. Sweet cherries, *Prunus avium,* Linn.
2. Sour cherries, *Prunus cerasus,* Linn.

Peaches:

1. Common peach, *Prunus Persica,* Sieb. and Zucc.
2. Nectarine, *Prunus Persica,* var. nucipersica, Schneid.
3. Apricot, *Prunus Armeniaca,* Linn.

PLUMS

Prunes. — We have all heard the remark that " all prunes are plums, but not all plums are prunes." This is but another way of stating that the plum industry has two divisions: the fresh-fruit industry, and the prune or dried-fruit industry. A prune is a plum that can be dried successfully without the removal of the seed. In addition, it should be " prune-shaped" and is generally blue in color. The prune as an article of commerce is supposed to have originated in Turkestan. It is now produced commercially in a few sections of central and southern Europe and in the Pacific Coast region of North America.

Common or Domestica Plums. — Our common plum, *Prunus domestica,* thrives best in an equable climate. This fact, together with the susceptibility of many varieties to brown rot, has limited plum production in most of the eastern part of North America. Varieties of this species readily find ideal growing conditions in the Pacific Coast section. This class of plums has most of the characters that are desirable in a fruit of this kind. The trees are shapely and of medium size. Many of the varieties are good producers. The fruit ranks high in quality and usually handles well.

Prunus domestica is supposed to have been introduced into

Europe from Asia Minor. It is grown more extensively in Europe than in this country, and many of our varieties are of European origin. Early settlers carried this fruit to America.

Groups of Domestica Plums

Prunes. — In Europe, the prunes are considered a distinct group. The common varieties in New England are Italian and Hungarian Prunes. Other varieties include Agen, Tragedy, Sugar, and Tennant. The fruit is usually oval and has one side straighter than the other. Varieties that have this form are sometimes spoken of as " prune-shaped."

Gage Plums. — This group is noted for high quality, but is quite susceptible to brown rot. The fruit is usually green or yellow. This group is popular in Europe. Bavay, Imperial Gage, and Washington are the more common varieties in America.

Lombard Plums. — Noted for vigorous, productive trees and low quality. Bradshaw and Lombard are popular varieties of this group.

Imperatrice Plums. — A rather large group of plums, having blue color, thick skin, firm flesh, and low quality. Monarch, Arch Duke, and Shipper are representative varieties.

Yellow Egg Plums. — This group includes some of our largest plums. It is best represented by Gold Drop and Yellow Egg.

Damson Plums. — Damson plums (*Prunus institia*) are noted for their lack of variation. The varieties cultivated to-day do not differ greatly from those described in our oldest records. Seedling trees are often nearly as good as our best cultivated varieties. This tart fruit is much prized for culinary purposes, and has long been popular in home plantings. Ease of growing, productiveness, and hardiness commend it to the orchardist and gardener.

Classification of Damson Plums. — *Prunus institia* is usually divided into four groups: (1) Damson, (2) Bullaces, (3) Mirabelles, and (4) St. Julians. The first includes varieties

FIG. 49.

Lower: A yellow Egg plum tree.
Upper: An Arch Duke (Imperative group) plum tree.
The camera was placed an equal distance from each of the above trees. Note the upright shapely growth of the yellow Egg variety. The curving branches of the Arch Duke come from heavy loads of fruit. The two trees illustrate differences in tree characters between these two groups of plums.

FIG. 50.

Upper: A seedling damson plum tree.
Lower: A native (Wayland) plum tree.
The camera was placed an equal distance from the above trees. Note the almost opposite habits of growth of these two kinds of plums.

like Shropshire. Mirabelles are small, yellow, freestone plums that are much prized in France. St. Julians are plum stock of the Damson type. The Bullaces include some roundish plums that closely resemble the Damson group.

Japanese Plums. — The Japanese plums, *Prunus salicina* and *Prunus Simonii*, have been rapidly increasing in popularity in this country. They are nearly as hardy as the *domestica* plums and more productive, have a more attractive fruit, and are adapted to a wider range of climate. Their chief failings are extremely early blooming, susceptibility to brown rot, and generally poorer dessert quality than that of the *domestica*. This group of plums came to us from Japan, but really originated in China. The foliage and habits of growth bear a striking resemblance to those of our native American plums. Japanese plums hybridize readily with some of our native species. Burbank, Red June, and Abundant are the most popular varieties in New England. Wickson and Climax (*Prunus salicina* × *Simonii*) are highly prized on the Pacific Coast. We have not as yet developed a classification or grouping of Japanese plum varieties.

Native Plums. — In many parts of the United States, one can still go out and gather quantities of wild, native plums. These plums are often of high culinary value and are very easy to cultivate. They are of many species and are adapted to a wide range of conditions. The Beach plums (*Prunus maritima*) thrive on the sandy beaches of Cape Cod, and the Wild Goose plums are found from Utah to the Atlantic Coast. The latter group is the leading type of plums in many parts of the South, west of the Mississippi River. While our native plums are of secondary commercial importance at this time, new varieties are likely to become quite important in the future. Our present grouping is by species.

CHERRIES

The cherry has long been a home or local fruit, and even to-day large commercial production centers are only partially developed. Probably none of our tree fruits is more widely

grown. Perhaps the wide distribution of the tree, the perishable nature of the fruit, and, in the case of sour cherries, its freedom from insects and diseases, have caused the cherry to remain a home fruit. On the other hand, the growing popularity of preserved cherries as a decoration for many dishes and the increased use of cherries for canning offer a convenient outlet for commercial orchards. Much as we may regret it, the present tendency is toward a decrease in home fruit plantings. This circumstance has encouraged the development of commercial production centers for cherries, and should continue to do so.

History of Cherry Industry. — Cherry pits are found in the caves inhabited by prehistoric man. Our earliest records indicate that the cherries of remote antiquity were remarkably like those of to-day. Both sweet and sour cherries, as cultivated in our orchards and about our homes, originated in southern Europe and the adjoining parts of Asia. The Romans introduced cherry culture into England, and the early colonists carried the pits with them to America. The Prince nurseries seem to have introduced named varieties to this country. Cherry growing in Oregon had its origin in the nursery of Henderson Lewelling, who hauled three hundred trees from Iowa in 1847. Seth Lewelling grew many trees from seed and selected such varieties as Bing, Republican, and Lincoln.

Sour Cherries. — The sour cherry, or pie cherry (*Prunus cerasus*), is more widely grown than the sweet cherry. It is about as hardy to cold as the apple and will grow on almost all kinds of soil. The trees are much smaller than those of the sweet cherry and are easily distinguished even at a distance. Sour cherry varieties are divided into two groups, Amarelles and Morellos.

Natural Classification of Sour Cherries. — Amarelles include sour cherries with colorless juice. The trees grow somewhat larger than the Morellos, and the fruit is less acid. Dyehouse, Richmond (Early), and Montmorency (Ordinaire) are good illustrations of varieties of this group.

FIG. 51.

Upper: A twenty-six year old English Morello cherry tree (center).
Lower: A twenty-six year old Early Richmond cherry tree.
These pictures were taken with the camera placed an equal distance from the trees. The Morello makes a dwarf tree compared with varieties of the Amarell group.

Morellos. — Morellos include a number of varieties having dark juice. The fruit ripens late and is very acid. The trees are dwarfish. The foliage of many of the varieties is very subject to leaf spot. Ostheim, English Morello, and Wragg are common varieties.

Sweet Cherries. — Sweet cherries (*Prunus avium*) are found growing wild in many parts of the North Temperate Zone where they have escaped from cultivation. The large

FIG. 52.

Upper: A Japanese flowering cherry (Prunus serrulata var. sachalinensis). This plant is an attractive ornamental that blossoms very early in the spring.

Middle: Prunus cerasus (Early Richmond). Slow growing trees often develop few spurs. Blossom buds occur both axillary and on spurs.

Lower: A shoot of Prunus avium. The buds are similar to Prunus cerasus, although larger. Spurs develop readily.

pyramid-shaped trees are very striking in their habits of growth. In spite of this, the sweet cherry is rather particular as to climate and soil. The blossom buds are tender to cold, being frequently killed in the colder parts of New England. The tree does not thrive where the summers are long and hot. It seems to prefer the cool nights and warm days that are

common in the higher altitudes. Sweet cherry varieties are divided into two groups, Hearts and Bigarreaus.

Natural Classification of Sweet Cherries. — Hearts include soft-fleshed varieties of sweet cherries. They are not so popular for canning as the firmer-fleshed varieties, but have long been popular in home plantings. Black Tartarian, Coe, Early Purple, and Governor Wood are well-known varieties.

The Bigarreau type of sweet cherry is by far the more popular. The firm flesh is desirable for canning, handling, and shipping. This group includes many of our leading commercial varieties, like Napoleon, Windsor, Bing, and Schmidt. Commercial sweet cherry growing seems to demand varieties of this type.

Duke Cherries. — Duke Cherries (*Prunus avium* × *cerasus*) are now considered crosses between sweet and sour varieties. They are likely to vary in the direction of either parent. Most of our cultivated varieties taste sour, but otherwise show many of the characters of sweet cherries. May Duke and Late Duke are leading varieties in America.

PEACHES

The peach, *Prunus Persica*, was introduced into Europe from Persia, and for a long time was thought to have originated in that country. It is now believed to have come from China, where we find types of peaches that are very different from those cultivated in our orchards. De Candolle claims to have found records of the peach dating from 2000 B. C. This fruit is widely grown in both the North and the South Temperate Zones. It was first brought to America by the Spaniards. Later, other strains were imported from other countries. This distinction is the basis of the Price-Onderdonk classification of peach varieties.

Price-Onderdonk Classification. — This grouping of peach varieties was first made in 1887. It is based on the adaptation of varieties to certain thermal belts, as well as on the origin of strains or races. The Spanish (or Indian) race came from Spain and developed in Mexico and among the Indians. It

is adapted to the warmer sections of our country, such as Texas. This grouping is the most widely recognized classification of peach varieties, but is being criticized by many authorities at the present time.

Peach Races. — The Peen-to race includes a group of varieties now grown in Florida. The fruit is very flat. The original variety, Peen-to, was introduced into this country about 1859. Many other varieties have originated in Florida. Some of the more important varieties of this group, all of which are adapted to subtropical conditions, are Angel, Bidwell (Early and Late), Clara, Hall, Jewell, Maggie, Suber, and Waldo.

South China Race. — This race originated from the variety Honey. The branches are less willow-like than those of Peen-to. The trees are about medium in size, and the blossoms are large. The fruit is slightly flattened, with a long apex. Climax, Pallas, Honey, Florida Gem, Imperial, and Taber are varieties usually assigned to this group.

Spanish Race. — This group is sometimes called Indian, although imported from Spain. The trees tend to grow large. The three races, Peen-to, South China, and Spanish, overlap considerably in adaptation. The Spanish race is adapted to a region somewhat farther north than that which is favorable to the first two. The varieties listed by Price as belonging to this group are Cobler, Columbia, Galveston, Guadalupe, Onderdonk, Lulu, Sanders, Texas and Victoria.

North China Race. — Descendants of the Chinese Cling variety. This group is slow in finishing the "rest period," and blossoms late. Wide adaptation and superior varieties have made the North China race prominent. Gould lists the following varieties as at least in part belonging to this group: Carmen, Connet, Elberta, Greensboro, Hiley, Lee, Lola, Mamie Ross, Ray, Rivers, Superb, Thurber, and Waddell.

Persian Race. — According to Onderdonk, this race includes certain importations from Persia to England and thence to America. The branches are short and thick; the blossoms are late and comparatively hardy to cold. Price lists Craw-

ford (late), Gold Drop, Heath (cling), Mountain Rose, Oldmixon, Reeves, St. John, and Salway as belonging to this group.

Many of the varieties grown in the United States and Canada belong either to the North China or the Persian race. Thus, Elberta, a cross between these two races, is a prominent variety from Texas into Canada. Peach varieties change rather rapidly and the above-named races are becoming mixed. In addition to the above objections, the layman has never been able to use this classification. The market is showing a strong preference for an Elberta type of peach. This is the only natural grouping of peach varieties that has been widely recognized.

Peach Keys. — Many peach variety keys have been devised in a period of more than a century. None of these is in com-

FIG. 53. A reniform peach gland (variety Elberta). Length of leaf petiole in cherries, pubescent shoots in European plums, and glands in peach varieties have been suggested as identification characters to use in recognizing varieties in the nursery row.

mon use. The nursery catalogues usually list peach varieties as freestone and cling, white-fleshed and yellow-fleshed, and according to season of ripening. These characters, together with glands and blossom, form the basis of most of the early keys for peach varieties. It is a rather interesting exercise to make one of these fruit keys for our more common varieties and then trace out some unknown. In doing so, it is important to remember that the peach responds readily to its environment. Varieties that usually are freestone sometimes become partly or wholly cling.

Upshall's Key for Peach Variety Certification. — In brief, Upshall suggests the following grouping of peach varieties for the purpose of variety certification of nursery trees:

A. Absence of yellow pigment in leaves. (White-fleshed)

I. Globose glands

1. Mountain Rose

II. Reniform glands

1. Belle
2. Carman
3. Greensboro
4. Leamington

B. Presence of yellow pigment in leaves (yellow-fleshed)

I. Globose glands

1. Brigdon
2. Early Crawford
3. Fitzgerald
4. New Prolific
5. Niagara
6. Reeves Favorite
7. St. John

II. Reniform glands

1. Admiral Dewey
2. Arp Beauty
3. Beer Smock
4. Cline Seedling
5. Elberta
6. (J. H.) Hale
7. Lemon Free
8. Lincoln
9. Rochester
10. Smock
11. Yellow Swan

III. Stalked reniform glands

1. June Elberta

In using this key, it is best to select only healthy, well-grown shoots that are well exposed to sunlight, and to select

leaves toward the middle of the current season's growth. The yellow pigment is more easily distinguished by examining the leaf against the sunlight. The above groups are then separated on the basis of shoot and leaf characters. Glands are said to vary considerably; but in so far as the author has tried out the above key it has held very well.

EXERCISES

Place a plus sign before each statement that is true and a minus sign before each statement that is not true. If any part of the statement is not true, consider the entire statement as false.

1. The Imperatrice group of plums is noted for high quality.
2. The Damson group of plums is noted for culinary quality.
3. Leaves of the Champion variety of peaches have a yellow pigment.
4. The glands on Elberta leaves are reniform in shape.
5. The juice of Early Richmond cherries is red.
6. The fruit of Damson and Japanese varieties of plums is noted for lack of variation.
7. Some of our native plum varieties are especially adapted to Kansas and adjoining sections.
8. Seth Lewelling originated the Bing and Republican varieties of sweet cherries.
9. Blossom buds of sour cherry are more hardy to cold than blossom buds of sweet cherry.
10. Heart group of sweet cherries has firm flesh.
11. Duke varieties of cherries resemble both sweet and sour cherries.
12. The peach is now thought to have originated in Persia.
13. Leaves of the Fitzgerald peach have a yellow pigment and reniform glands.
14. Peach varieties of the Spanish race are adapted to northern peach sections.
15. Early Crawford is a freestone peach.

REFERENCE READINGS

HARTMAN, HENRY, "The Elements of Systematic Pomology," 1923.
WAUGH, F. A., "Systematic Pomology," pp. 175–200, 1903.

CHAPTER XI

FRUIT JUDGING AND FRUIT SHOWS

Fruit judging, as it has been developed in many of the fruit classes of our agricultural colleges, is not exactly what the name would seem to indicate. The judging of fruit, whether at the county fair or in the class room, offers the best opportunity for the study of variations within varieties. We cannot claim to know a given variety until we know the more common differences found among specimens. Variation is the rule in plants. It has often been claimed that no two leaves on a tree are exactly alike, and this is also true of specimens of fruit on an individual tree. The author's students have often said that there is no one way of identifying any given variety.

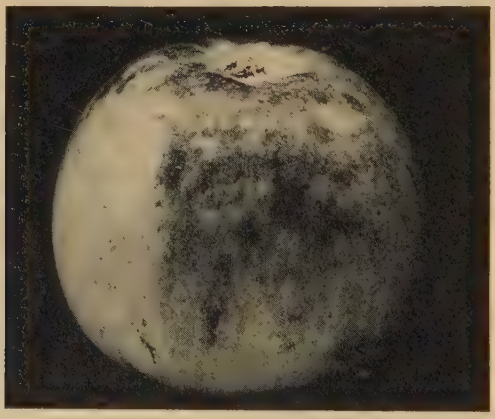


FIG. 54. — The discoloration is due to storage scald. This is a serious defect as it injures both the selling and storage quality of the fruit.

Apple Identification Characters. — The first requirement of any fruit judge is a knowledge of varieties. The beginner should select the two or three characters that seem to provide the most constant means of identification for the varieties

in question. This list of characters can be easily extended as one becomes more proficient. The following is a list made out by the author when he started to practice apple judging as a student. It probably is not the best that could be chosen, but will do as a start.

Arkansas — Oblate conic form, hard flesh and furrowed basin, heavy weight.
Baldwin — Sunken dots, not stippled coloring.
Ben Davis — Tendency to russet; striped coloring; light weight.
Delicious — Ribbed and pentagonal in cross-section; long stem.
Fallawater — Round form; scarf skin; large, areolar dots.
Grimes — Deep, abrupt basin; open calyx; aroma.
Hubbardston — Dull shade of red; rough skin; "leather" cracks in basin end.
Jonathan — Abrupt basin; small dots; shiny skin.
McIntosh — Soft flesh; aroma; shallow basin.
Northern Spy — Symmetrical form; wide, deep cavity; narrow, abrupt basin.
Northwestern Greening — Transparent skin; white, submerged dots; symmetrical form.
Rhode Island Greening — Waxy skin; irregular form; numerous, large dots.
Rome — Long stem; waxy skin; wide, shallow cavity.
Roxbury — Oval cross-section; rough skin.
Stark — Scarf skin; dull red coloring; large, thick calyx lobes.
Stayman — Large, areolar dots; curving conic form; deep cavity.
King (Tompkins) — Stippled coloring; scarf skin; shallow basin.
Wagener — Scarf skin; wide basin; oblate form.
Wealthy — Abrupt basin; dark shade of red; elastic flesh.
Winesap — Shallow, wavy basin; conic form.
Winter Banana — Suture lines, straw-yellow color; submerged dots.
Yellow Bellflower — Furrowed basin end; deep cavity.
Yellow Newtown — Scarf skin; truncate form.
York (Imperial) — Truncate, oblique form; pink shade of red; narrow cavity.

Judging Rules. — One of the first requirements in starting a baseball game is a set of rules. Harmony cannot be maintained unless most of the players understand the rules and

everyone abides by them. Competition adds interest to fruit judging, but those who compete must be familiar with the rules at the very start. A number of rules have been developed in apple-judging contests in various sections of our

Fig. 55. — Delicious apples from Massachusetts showing very large and medium sized specimens. Fruit judging is an interesting way to study variations in varieties. The successful coach will present the more common differences within each variety and see that his team is reasonably familiar with these variations, such as color, form and ripeness.

country. Most sections are using a set of rules that at least closely resemble the American Pomological Society's rules for their International Intercollegiate Contest. Their 1924 rules are as follows:

Section I. — Each team shall consist of three men who are undergraduates in any agricultural college in North America offering a course in horticulture. To be eligible, the student may be enrolled in any agricultural course and must not have taken part in one of these contests or other intercollegiate contests any previous season. Competition in any such contest this season, however, will not bar a student from this contest. A person doing graduate work is not eligible; however, a student with a degree in some other course may participate provided he is registered entirely for undergraduate work.

Section II. — Twenty classes, each containing three plates of five apples each, will be used. These classes will be selected from the following list:

1. Arkansas (Mam. Black Twig)
2. Baldwin
3. Ben Davis
4. Delicious
5. Fallawater
6. Grimes
7. Hubbardston
8. Jonathan
9. McIntosh
10. Northern Spy
11. Northwestern Greening
12. Rhode Island Greening
13. Rome
14. Roxbury
15. Stayman
16. Tompkins King
17. Wagener
18. Winesap
19. Winter Banana
20. York Imperial
21. Yellow Newtown
22. Yellow Bellflower

The fruit for the contest shall be provided by the colleges competing or by the American Pomological Society. There shall not be more than one class of any one variety. The plates shall be labeled consecutively from 1 to 60. Each apple will also be numbered. Thus 6-*a*, 6-*b*, 6-*c*, 6-*d*, and 6-*e* shall be the designations of the apples on plate #6.

SECTION III. — The fruit provided for the contest shall be arranged by the coaches of the competing teams and judged by a disinterested party. The coaches will also be expected to grade papers, attend to other routine matters connected with the contest and prepare an official report of the contest to be handed to the Secretary of the American Pomological Society.

SECTION IV. — The placing of the plates will be based on the following score card:

Condition	30
Color	20
Size	15
Form	15
Uniformity	20
	100

Form. — In judging form, typical form for the variety will be considered.

Size. — The most acceptable commercial size for the variety shall be considered as the ideal.

Color. — The most acceptable commercial color shall be ranked highest. On uncolored apples a blush will not be considered favorable or otherwise. Grimes, Northwestern (Greening), Rhode

Island (Greening), Yellow Newtown, Fallawater, Roxbury and Yellow Bellflower will be considered as uncolored varieties.

Uniformity. — Uniformity of size, color and form will be considered.

Condition. — Heavy cuts shall be made for scab, entire absence of stem, bruises, breaks in the skin, evidence of wilting, storage scald, or any other unsoundness which may tend to cause the premature decay of fruit.

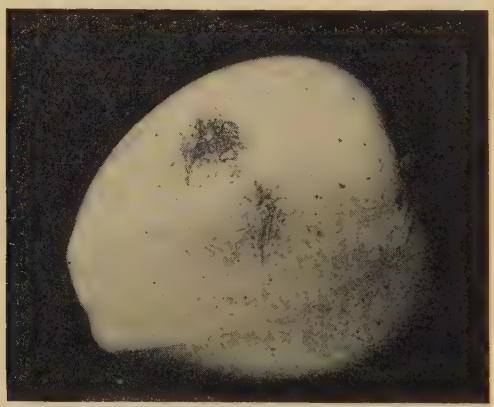


Fig. 56. — A limb rub on an apple. Such scars look badly, but are not classed among the more serious. A good fruit judge should be able to identify most marks or disfigurations on fruit.

Table bruises due to handling of fruit during the contest shall not be considered. Fruit must in no instance be bruised or altered in any way by the contestant.

Actual scoring of fruit will not be insisted upon, but any contestant who desires may score the fruit, and score cards will be provided for the purpose.

Placing. — The ranking of contestants on placement shall be determined on the following basis:

1–2–3	100 points
1–3–2	80 "
2–1–3	60 "
2–3–1	40 "
3–1–2	20 "
3–2–1	0 "

Ranking on placement when substitutions are involved.

(*a*) Plates wholly or partly substituted shall not be considered in placing. When a variety contains one substitution which is recognized by the contestant and the other two plates are placed in the correct order, the contestant receives 100 points. If the two plates are not placed in the correct order the contestant receives 0. If the substitution is *not* recognized and is placed the contestant receives 50 if the other two plates are in the correct order, 0 if the other two plates are not in the correct order. If one substitute is named when not present and the others are placed in the correct order the contestant receives 50. If not in the correct order 0.

(*b*) In case two plates are substituted and are recognized, contestant receives 100. If only one is recognized and the plate containing no substitution is placed first, the contestant receives 50; if the plate containing no substitution is placed other than first, the contestant receives 0. If neither of the two substituted plates are recognized and the plate with no substitution placed first, contestant receives 25 points. In the case that two substituted plates are named when not present and the first plate is correctly placed, the contestant receives 25 points on placement. If not correctly placed, 0.

Identification. — One entire plate or parts of one or two plates, one entire plate and part of another plate may be substituted in any variety.

(*a*) In plates partly substituted there will never be more than one substituted specimen per plate.

(*b*) No substitutes will be selected from varieties other than those mentioned in Section II.

In the identification of a plate partly substituted, the name of the class shall first be given and then the name and number of the substitute. Thus the record of a Baldwin class might be as follows:

Plate #6 Baldwin
" #7 King (substitute)
" #8 *a*, *c*, *d*, *e*, Baldwin and 8-*b* Ben Davis.

The ranking of a contestant in identification will be determined as follows:

For the correct identification of three plates in a given class including all substitutes if any ..... 100 points.

For the correct identification of two plates in a given class including all substitutes if any ..... 66 points.

For the correct identification of one plate in a given class including all substitutes if any ..... 33 points.

Failure to correctly identify any of the 3 plates in a given class ..... 0 points.

Courtesy W. Paddock.

FIG. 57. — A class in apple judging. A liberal use of substitutes makes identification difficult. Certain phases of Systematic Pomology can best be presented in judging work. Apples, pears and "cold pack" small fruits are excellent material for judging work.

SECTION V. — The team that receives the highest total score shall be declared the winner of the contest. The team score shall be the sum total of the individual scores. The individual score shall be the sum total of the points received for placing and identification. 4000 points shall be considered a perfect score for each contestant.

SECTION VI. — Contestants shall be given at least three hours in which to rank the plates and prepare their reports. The coaches may extend this time at their discretion.

Score Cards. — Mose people prefer to judge two samples by comparison rather than actually to score each sample. Comparison is the more rapid method, and, unless the samples are very close, is nearly as accurate. The guide in the comparison of two specimens is the score card. When the decision is very close or important, it is usually best actually to score each sample. When there are many samples in a given class, it is often possible to discard the poorer ones and actually score only the best or the ones that are most difficult to place.

Form. — Almost any variety will vary considerably in form. Thus, Baldwin will vary from somewhat oblate to somewhat oblong. This item on the score card is to guard against misshapen specimens and extreme variations. The danger of the beginner in studying variations in varieties is to consider any form, except a certain one, an extreme.

American Society for Horticultural Science Standard of Sizes for Show Apples. — The following are listed as ideal sizes for show fruit in North America.

	Inches in Diameter
Arkansas	3 to 3½
Baldwin	2¾ to 3⅜
Ben Davis	2¾ to 3¼
Delicious	2⅞ to 3¼
Esopus	3 to 3½
Grimes	2¾ to 3¼
Hubbardston	2¾ to 3¼
Jonathan	2¾ to 3
King David	2¾ to 3¼
King (Tompkins)	3¼ to 3¾
McIntosh	2¾ to 3½
Northwestern Greening	3¼ to 3¾
Rhode Island (Greening)	3 to 3⅜
Rome	3 to 3½
Roxbury	2⅞ to 3¼
Spy (Northern)	3⅛ to 3½
Stark	3 to 3⅜
Stayman	3 to 3⅜
Wagener	2¾ to 3⅜
Wealthy	2¾ to 3¼
Winesap	2¾ to 3
Winter Banana	3⅛ to 3½
Yellow Bellflower	3 to 3¼
Yellow Newtown	2⅞ to 3⅛
York (Imperial)	3⅛ to 3⅜

This size standard is based on commercial or selling requirements and tendencies of varieties. A given variety is scored perfect on size if within certain limits. None of the above varieties should be less than $2\frac{3}{4}$ inches in diameter, nor over $3\frac{1}{2}$ inches.

Color. — The commission merchants often say that 70 per cent of the sale value of a given variety or lot of fruit depends on color. Some fruit growers complain that ideal color is impossible in their orchards. The score card has taken a medium position by allowing 20 per cent of the total score to color. The amount and shade of color is of considerable importance. Most judges prefer cherry red in Baldwins to the duller shades, partly because brighter shades of color are an indication of quality, and partly because they are more attractive to the buying public. It is customary in the northeastern part of the United States to score well-russetted specimens of Roxbury and Golden Russet higher than unrussetted specimens. As a rule, varieties like Grimes, Rhode Island (Greening), Northwestern (Greening), and Yellow Newtown are considered uncolored varieties. A blush on uncolored varieties should be disregarded in judging color. If some of the specimens on a given plate are blushed and some uncolored, the entry will lack uniformity.

Uniformity. — Any product looks better when it is of uniform size, color, ripeness, and shape. This is true of various products, like potatoes, fruit, eggs, and butter. Large fruit is preferred by some and small fruit by others. As a rule, very large specimens of a given variety should be sold earlier in the season than medium-sized specimens. Uniformity is desirable in a market product, both from the grower's and the buyer's point of view.

Condition. — In addition to the above, most coaches divide the ordinary troubles that disfigure fruit into three classes. The following list was made out in the New England fruit-judging league. It has no standing, but most coaches would probably give it a general endorsement.

Class I. Very serious troubles, which will disqualify in

many cases: Codling moth, San José scale, soft rot, scab, railroad worm, Arkansas blotch, bitter rot, storage scald, heavy bruise, curculio, and withering (shop worn).

Class II. Serious blemishes: Red bug damage, water core, black rot, Baldwin spot or physiological breakdown, overripe (soft), cedar rust, fruit spot, Brooks spot, sooty fungus, missing stem, insect stings (unidentified), and small skin punctures.

Class III. Less severe blemishes than the preceding groups: Red spots (not identified), hail or similar spots, limb rubs, russetting (cause unknown), and small packing bruises.

Principles Followed in Judging Condition. — Many of the above defects justify a lowering of the score, since they cause, or are likely to cause, premature decay of the fruit. In taking this stand, the judges are considering the matter largely from the point of view of one purchasing the product. From the same point of view, anything marring or detracting from the appearance causes a lowering of the score. A large amount of scab detracts more than a small speck. This is a point of view on which nearly all agree.

Another and a quite different point of view in judging is that of the producer. Thus, if one were judging poultry, a certain type might be the best for egg production, but might not be the most attractive in appearance, or conform to the ideal for the breed. This is best illustrated in fruit judging by San José scale. Most purchasers never notice an occasional scale on apples, but its presence lowers the score because it is an extremely destructive insect. In the warmer parts of our country, fruit is usually disqualified when San José scale is found. In the colder part of New England, it is considered of minor importance because it is held in check by winter conditions. Water core also illustrates this point of view. This defect is beyond the control of the grower, and therefore should be scored moderately.

American Society for Horticultural Science Score Card for Boxed Apple Classes. — The American Society for Horticultural Science score card for boxed apple classes is essentially as follows:

Score card for a given variety:

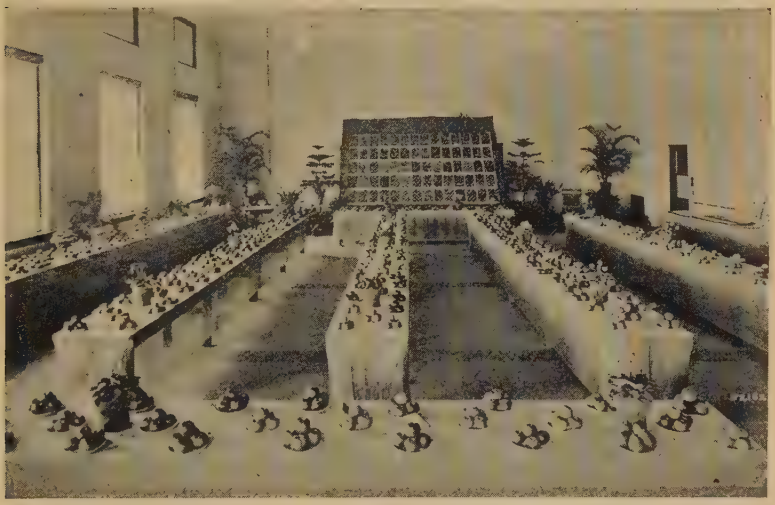
Quality of fruit	*Points*	
Texture and Flavor	100	
Size and Form	100	
Color	150	
Uniformity	150	
Freedom from Blemishes	150	
Total		650
Package		
Material	30	
Marketing	10	
Solidity (Nailing, Cleats, etc.)	10	
Total		50
Packing		
Bulge	100	
Alignment	20	
Height of Ends	60	
Compactness	80	
Attractiveness and Style of Pack	40	
Total		300
Total points		1000

"Texture and flavor" are rarely used in fruit judging at the present time. "Freedom from blemishes" has been replaced by the term "condition," at least in most sections of North America. The author prefers to judge quality of fruit by the American Pomological Society's score card given earlier in this chapter. The ratio between quality of fruit, package, and packing is 13 : 1 : 6. In judging sweepstake prizes, "value of variety" is usually included under quality of fruit.

Judging Fruits Other than Apples. — Most of the preceding remarks will apply to the judging of pears, grapes, and other

kinds of fruit. The only limiting factor is the supply of fruit. By putting in a large number of substitutions, identification becomes of primary, and placement of secondary importance. The apple-judging rules will apply equally well to grapes. A somewhat different score card was formerly used for grapes. The author prefers practically the same score card for grapes as for apples, but it must be remembered that in the case of grapes size applies to both bunch and berry. Condition, uniformity, and color should apply equally well to a sample of cherries, raspberries, blueberries, apples, or pears.

Judging Nut Fruits. — There are a number of score cards for grading pecans, walnuts, and almonds. Such score cards include kernel, shell, and external characters and necessitate



Courtesy W. Paddock.

FIG. 58. — A fruit show arranged, managed, and financed by students. Such a fruit show is splendid business training for the students aside from its pomological value. The bank of apples is a good illustration of a commercial display. Plate classes are largely competitive among the students. The experiment station collection of varieties on the left is a good illustration of an educational exhibit.

cracking some of the nuts. These items are desirable for comparing samples of many varieties, but are ill adapted to intercollegiate judging. The author has been unable to dis-

cover even a tentative score card of this type, and therefore suggests the following:

Form	10
Size	15
Color	15
Uniformity	20
Seal	20
Condition	20
	100

The above includes the usual characters with the addition of " seal." The latter is a very important factor in the keeping and handling quality of nut fruits. Poorly sealed samples open in handling and become rancid.

FRUIT EXHIBITIONS

Most fruit exhibits can be divided into three fairly distinct classes, namely, non-professional, educational, and commercial. The first was the prevailing type in America a hundred years ago. We still have many of these non-professional shows, although they have declined along with home fruit growing. The fruit shows of hundreds of villages and cities in the eastern part of North America, and most of the fruit shows of Europe, are largely non-professional with some commercial classes. Hot-house grapes and autumn-ripening strawberries are common classes in New England fairs of to-day. Then we have the home variety collection which may include anything the grower happens to fancy. Some fairs offer prizes for the largest apple by actual weight. Another class includes new varieties of merit, either with or without a limit to the number of awards. A large part of the single-plate classes in most fairs cater to the non-professional exhibitor. This is the chief reason for offering prizes on such varieties as Swaar, Pecks Pleasant, and Lady among apples, or Agawam and Eaton among grapes.

Future of Non-professional Exhibits. — American pomology is in the period of commercial production. We must expect

commercial exhibits partly to replace the non-professional type. Yet, the non-professional show and exhibit has a distinct place, and a service to perform. The automobile is developing the suburbs of our cities. Friendly competition among fruit lovers in this suburban population ought to increase rather than decrease. Moreover, there are large areas in North America ill adapted to commercial fruit growing. Here the amateur fruit show has just as large a place as ever. All who believe that American Horticulture will slowly approach that developed in Europe must look forward to a return of the amateur fruit exhibits.

Educational Fruit Exhibits. — Educational fruit exhibits form an interesting non-competitive feature of many fairs, shows, and meetings. They may include almost anything in the field of Pomology. Some of the more common educational fruit exhibits that relate to Systematic Pomology are as follows: a comparison of Delicious (or any other variety) apples grown in various parts of North America; a booth illustrating variety nursery certification; various groups of variety collections like "New and Untried"; the culinary quality of Early Black cranberries grown in Massachusetts compared with the same variety grown in New Jersey; a comparison of cranberry sauce from seven varieties of cranberries. The only limit to the possible variations in this type of exhibit is that of the subject matter to be presented and the ingenuity of the exhibitor. At any students' fruit show, such exhibits will be found both interesting and profitable.

Commercial Exhibits. — The primary object of commercial exhibits is to advertise the fruit of the exhibitor and improve the business. Thus, a plate class for the "Five Best Commercial Varieties of Pears" tends to call attention to the best varieties and to discourage the growing of less desirable ones. If prizes are offered only on McIntosh and Baldwin in the box classes, other varieties are not emphasized.

Window Displays. — Competitive window displays of fruit in connection with fruit shows and National Apple Week have great advertising value and are very interesting. In

Courtesy Massachusetts Department of Agriculture.

FIG. 59.

Upper: An attractive window display during National Apple Week, 1924.
Lower: First prize window display, Salem, Massachusetts, National Apple Week, 1924.

Such window displays are made with the idea of promoting the sale of fruit. They are good illustrations of commercial display.

either case, the organization conducting the contest puts good growers in touch with merchants willing to furnish a window. The grower supplies the fruit and advertising material. Either the grower or the merchant may decorate the window, and either or both may secure prizes. This may be used to advertise a certain variety, brand, or fruit in general.

Booths. — Another illustration of this type of exhibit is the display of fruit in various kinds of booths. At some shows, growers are offered the use of sales booths, where fruit can be exhibited and sold, and orders taken. Other fairs require that the booth be for display only, the exhibitor being permitted to take orders for fruit, but not to disturb the exhibit. Coöperative sales organizations often prepare non-competitive fruit displays to advertise their products.

All commercial exhibits should contain good varieties, fancy fruit, and be attractively displayed. It is often called " backward " advertising to include poor varieties and inferior fruit in such displays. In judging window displays during National Apple Week, the author found many very attractive windows in which the fruit really helped to sell candy or breakfast food. If we are exhibiting or advertising Stayman apples, they should be the dominant feature. A bank of Baldwin apples, contrasting with unblushed Winter Banana and decorated with laurel leaves, forms an attractive color combination. Commercial exhibits offer all kinds of possibilities for the future, and will undoubtedly become a more prominent feature of American Pomology.

QUESTIONS

1. What are some of the common variations in Baldwin, McIntosh, Ben Davis or Winesap apples?
2. Distinguish clearly between Baldwin and King apples. What are the more constant distinguishing characters?
3. What are some of the principles considered under "condition" in judging apples?

4. Choose an unlisted blemish (as green fruit-worm injury) and add it to the classified list which depends on severity of scoring, other things being equal.

5. What are the more important factors to consider in selecting Valencia oranges for show purposes?

6. What are the more important factors to consider in selecting Schley pecans for a competitive exhibit?

CHAPTER XII

DEVELOPMENT OF FRUIT VARIETIES

The development of fruit varieties in North America is as romantic as the settlement and development of our country. In fact, the two are closely related. Early explorers, gold hunters, adventurers, and settlers brought with them the

FIG. 60. — Original Concord grape vine as it appeared in 1925. This variety, adapted to a cold environment, has been a blessing to millions of persons. Concord started the commercial grape industry of Canada and eastern United States. It is a splendid table and juice grape.

various kinds of fruit which they had grown in the old country. Often the plants failed to thrive; but if not too ill adapted, they passed through a period of acclimatization. These imported fruits rarely found an ideal environment.

Colonial Grape Growing. — For two centuries our ancestors tried to grow vinifera grapes, even importing experienced

gardeners and vine dressers. Early colonial records from Virginia to New England are full of these attempts. Sometimes the grapes succeeded for a time, only to become sick and die. The most marked success that was achieved was due to mistaking the Alexander or Cape grape (a native) for a vinifera. The acclimatization of vinifera grapes was accom-

Courtesy H. E. Jacob.

FIG. 61. — Old Mission grape vine at Carpintaria, California, one of the oldest vines of this part of United States (now dead, 1925). A pioneer among the many varieties of vinifera grapes that have been imported from foreign countries. Note the contrast between this ancient vine and the Concord vine, Figure 60.

plished in the eastern part of the United States by hybridizing with our wild native grapes (labrusca). Catawba, which originated about 1802, was our first really meritorious variety. Rogers' many hybrids are the result of more careful crossing.

During this long period of about two hundred years, another great change had taken place, not in our cultivated grapes, but in our people. We had developed an appreciation of the merits of our native grapes.

Native Grape Industry. — Our native grape industry came into existence through the selection and propagation of superior native grapes. This is the method of improvement used with practically all of our native fruits. Among the millions of native forms, we make selections and place them under cultivated conditions. Ephraim Bull selected certain wild grapes from the seed of which he grew the Concord. This

Courtesy University of Arizona.

FIG. 62. — Bahia (Washington Navel) orange tree. This variety has had a very great influence on the entire citrus fruit industry. It was imported from Brazil by the United States Department of Agriculture.

variety is to-day grown from the Atlantic to the Pacific, and from well into Canada on the north to our more southern states on the south. Labrusca grapes are primarily table grapes and make only mediocre wine. This resulted in the development of the grape juice industry, which started about 1890. Concord is the leading variety for this purpose.

Vinifera Grape Varieties. — European, or vinifera, grapes found a more congenial environment in Mexico and southern California. The early missionaries were an important factor in the establishment of grape culture in this region. Imported varieties have found favorable conditions in southern California; hence many of the leading varieties there are of foreign

origin. This suggests that California grape growing did not need to pass through a period of acclimatization. Sultanina (Thompson Seedless), Alexandria (Muscat of Alexandria), Alicante Bouschet, and most of the more important varieties originated in Asia or Europe. Wild seedling grapes usually perish under California conditions. This is perhaps another reason why most of the varieties grown in this region are of foreign origin.

Grapefruit Varieties. — Grapefruit varieties offer a striking contrast to California grapes. This fruit was brought to Florida by the Spaniards, and soon grew wild. For years, these wild grapefruit trees and their fruit were little valued. We might consider this period one of adaptation. Most of our present-day varieties of grapefruit were selected from these wild trees. No careful breeding has entered into the improvement of this fruit. Much has been accomplished and doubtless will be accomplished by selecting the best forms grown from seed.

To-day the grapefruit is in its third stage of development, namely, bud selection. The grapefruit of to-day is a result of importation, adaptation during a period of growing wild, selection and vegetative propagation of superior wild forms, and finally the selection of superior strains of a given variety through taking bud wood from branches producing superior fruit.

Citrus Fruit Strains. — Citrus fruits are noted for bud sporting; that is, branches from a certain bud show marked differences from the rest of the tree. In the earlier stages of the development of citrus fruits, this peculiarity caused great variations within a given variety. As was to be expected, many of these bud sports were undesirable, and early orchards contained many unprofitable trees. Perhaps some of these rogue trees were due to environment. The selection of propagating wood from branches producing superior fruit has undoubtedly improved the quality of citrus fruits on our markets.

Colonial Apple Growing. — The apple, among our northern fruits, has passed through stages of development that are

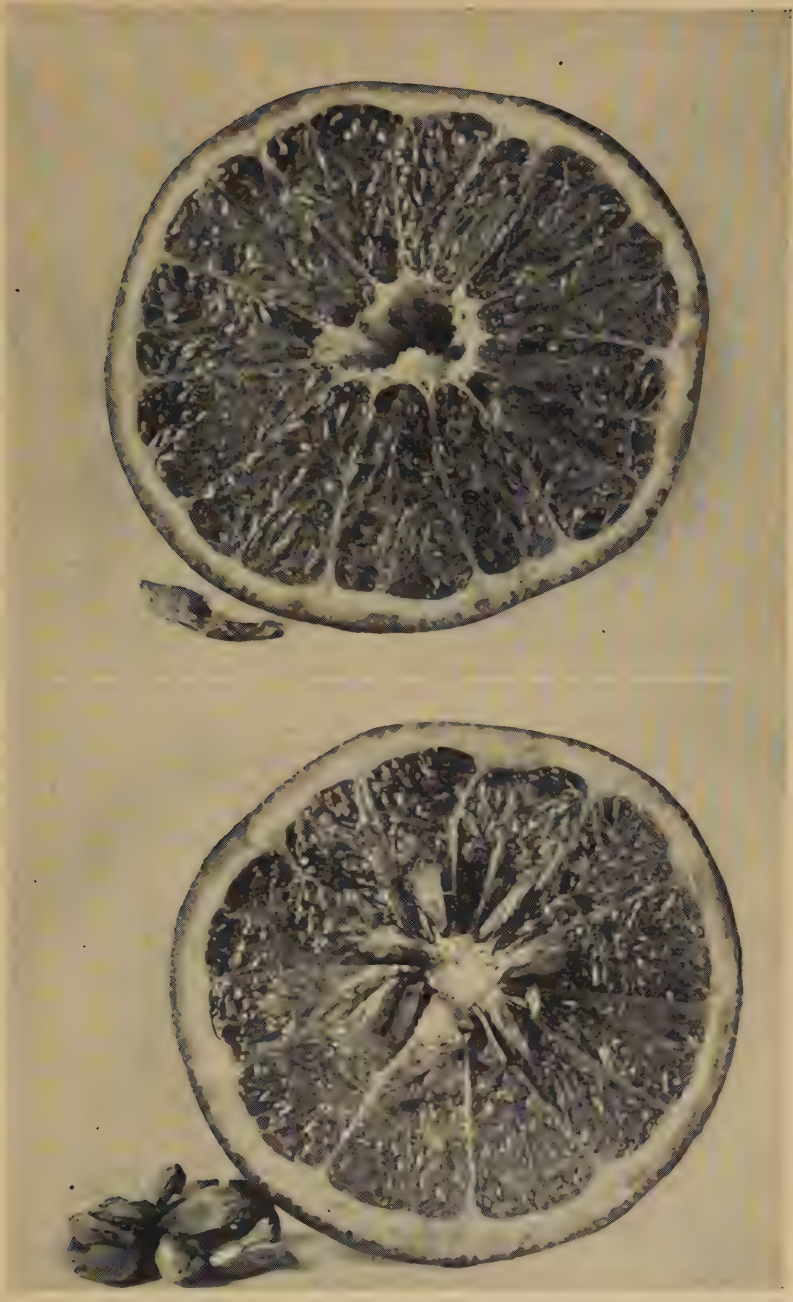


FIG. 63.

Upper: Marsh grapefruit. Lower: Duncan grapefruit.

The pile of seeds to the left in each case were taken from the other half of the fruit. Seediness is a very important commercial character of varieties of citrus fruits. Present day tendency is to select for few seeds combined with quality. Nearly seedless varieties of grapefruit look more attractive when ready to serve.

nearly as interesting as those of the grape and grapefruit. From the first, imported apple seeds and trees found congenial soil and climate in the cooler parts of North America. For years, pasture orchards have grown practically wild in New England. Perhaps that is why New England has originated so many apple varieties. Really superior varieties were quickly noticed in these early cider orchards.

FIG. 64.

Upper: Schley pecans.

Lower: Wild seedling pecans purchased on a northern market. Wild pecans often have thick shells, small inferior kernels, and are often variable both in size and quality. Compare with Schley, which has a thin shell, and plump, high quality kernel. Schley is only medium in size compared with some cultivated varieties.

Johnny Appleseed Orchards. — One of the most romantic characters in American Horticulture is John Chapman, who was called Johnny Appleseed. Leaving the settled portion of the Atlantic seacoast, he traveled down the Ohio river and along Lake Erie, planting seedling orchards in what was then the Northwest Territory. Tradition tells us that this pioneer fruit grower made small clearings for his orchards and built brush fences about them, even caring for the trees for several years. An occasional original Johnny Appleseed apple tree is still found in Ohio and Indiana.

Systematic Apple Breeding. — A new factor has entered into the development of apple varieties in recent years, namely, that of careful systematic crossing of selected varieties. New York pomologists have spent years trying to develop a series

Courtesy Stark Brothers Nursery Company.

FIG. 65. — Two views in the variety test orchards of Stark Brothers Nursery of Louisiana, Missouri. These new varieties were selected from millions of trees over North America, and are now given a second trial before being offered to the public. A splendid illustration of the possibilities of selection. The men are horticulturists from many parts of North America inspecting these trial trees.

of McIntosh type apples for all seasons. In Ontario, Canada, McIntosh has been used in many crosses with crab-apples to secure very hardy forms. Cortland, Macoun, Early McIntosh, Lobo, and Melba are among the more promising varieties originated in this way.

Bud Sport Varieties of Apples. — Bud selection has played a small part in the development of apple varieties, although a number of bud sports are now promising. Red Rome, Red Spy, Red Oldenburg, and Red Gravenstein are good illustrations of bud sports. Perhaps they have been more numerous than we have realized. Both Baldwin and Grimes often sport in the direction of russet, but this is an undesirable sport.

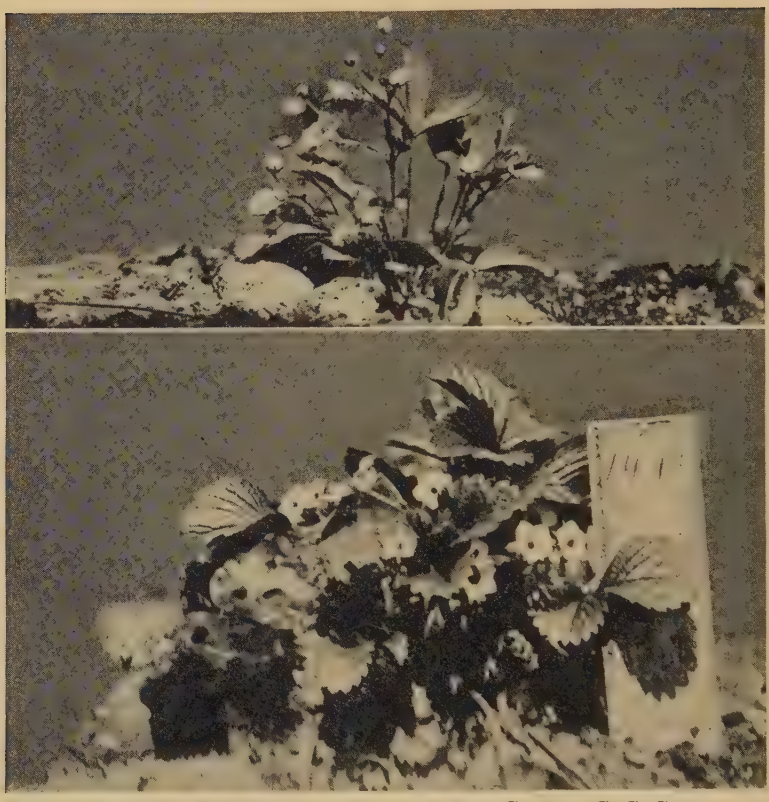
Strawberry Varieties. — The strawberry has had a very different history from that of our other fruits. Early settlers cultivated the Virginian strawberry, which they found growing wild. At a later date, the superior shipping and handling quality of the Chilean strawberries caused them to replace the earlier forms. The Chilean strawberrry is now cultivated in both Europe and America, having been introduced from Europe, although a native of western North and South America. So complete has been this change that only a few imaginative strawberry breeders dare to work with species other than *Fragaria Chiloensis.* Varieties of the strawberry have changed rapidly, perhaps because new varieties can be tried out easily. This ease of growing and trying out new varieties has been an important factor in the acclimatization of Chilean strawberries in eastern North America. Nevertheless, there is scarcely a fruit grown commercially in North America that is more handicapped with poor and mediocre varieties than is the strawberry. The inference is that this fruit from South America and our western coast is not yet fully acclimated. Professor V. R. Gardner[1] claims that bud sports among strawberries are degenerate forms.

[1] Gardner, V. R., "Bud Selection with Special Reference to the Apple and Strawberry," Missouri Agricultural Experiment Station, Research Bulletin 39, 1920.

Courtesy Stark Brothers Nursery Company.

FIG. 66. — Original Delicious apple tree.

This variety has had a large influence on the dessert apple trade. Delicious is recommended for planting in more sections of the United States and British Columbia than any other apple variety.



Courtesy C. C. Georgeson.

FIG. 67.

Upper: The wild strawberry of Interior Alaska (F. platypetala). We might call it a rather unpromising looking parent, with small, worthless fruit. F. platypetala is very hardy to cold.

Lower: A hybrid plant developed for an Alaskan environment. This station is using wild plants from the interior, cultivated varieties, and wild plants from the coast as breeding stock.

Sweet Cherry Varieties. — The sweet cherry has had a long period in which to become adapted to our conditions. This fruit was imported both by early settlers and by the Prince Nursery of Long Island, New York. The trees survived and are now grown commercially, but our present-day varieties are only moderately adapted to many sections. Sweet cherry trees, carried westward by the pioneer cherry

grower and nurseryman, Henderson Lewelling, found a more favorable environment on the Pacific Coast. This was the beginning of sweet cherry growing in that region. To-day, the sweet cherry grows wild in many places in Pennsylvania and Virginia. Perhaps in time, we may hope to hear of selected, meritorious varieties from this section, as well as from the breeding work of experiment stations.

Courtesy H. J. Franklin.

FIG. 68. — A young specimen of Pioneer blueberry bush in fruit. This variety is a result of breeding from selected parents. Breeding from selected parents has resulted in many good varieties of blueberries, and in time should give further improvement.

The Blueberry. — The history of most of our native fruit varieties shows, at first, a dependence on the wild crop. Wild fruits are usually variable in quality, often uncertain, and, as the country develops, constantly diminishing in quantity. It is indeed interesting to gather blueberries in the mountains

of Maryland or on the blueberry barrens of New England. The wild blueberry crop is very inferior to selected wild forms. Selection and segregation have worked wonders with the blueberry. This has been due partly to the method employed. A cash prize was offered to anyone locating plants meeting certain requirements, especially as to size of fruit. It is to be hoped that the breeding of these selected forms will give us further improvement.

Pecan Varieties. — The pecan is the most prominent of our many kinds of native nut fruits. This is the nut fruit of the southeastern part of the United States, especially the Mississippi Valley. The variety Schley is as great an improvement over the wild pecan as the Pioneer blueberry is over the wild crop. The blueberry improvement has been largely in size of fruit. Our better pecan varieties have thinner shells, larger and better-flavored kernels, as well as better tree characters. These improved varieties have already become the basis of a pecan industry in the southeastern part of the United States. New varieties are developing rapidly. Selected parent plants and breeding should in time give us further improvements.

Mass Selection. — The selection of superior varieties from chance seedlings, including wild forms, has produced a large proportion of the varieties of fruit that are cultivated to-day. The number of really superior individual plants is perhaps small when compared with the total. Hundreds of selections have been made and discarded. Hundreds of persons are remembered because they found a Seckel pear or a Delicious apple, and justly so. These discoveries have contributed greatly to the fruit supply of the American people.

Systematic Plant Breeding. — Early attempts at crossing varieties were not always successful. Thus, early experimental workers in Kansas tried to produce a variety with the dessert quality of Jonathan and the keeping quality of Ben Davis. Perhaps their selection of parentage was unfortunate. Other workers made crosses of Winchell (Green Mountain) grape on Concord, Moore or Worden, with the result that

Courtesy L. D. Batchelor.

FIG. 69.

Upper: Franquette walnuts on the tree.

Lower: Santa Barbara soft shell walnuts.

Note the spur system in each case. Santa Barbara soft shell varieties are very prolific. Walnuts of the Franquette type are more popular in central California than Santa Barbera soft shell varieties. The latter are descendants from seed probably imported from Chili. The former are of French ancestors.

nearly all the offspring were white-fruited. The Campbell grape often gives a large percentage of blue-fruited offspring. The fruit breeder is working with plants that are usually heterozygous. Some knowledge of his breeding stock is very important and often saves years of labor. Thus, Fameuse seedlings usually resemble apples of the Fameuse group. If we wished to develop a variety of peaches having buds that would withstand a temperature of thirty degrees below zero Fahrenheit without injury, we could hardly hope to succeed by using our cultivated varieties for parents. A very hardy form of peach might be secured from northern China. Then this hardy form might be crossed on our better cultivated varieties, to secure a combination of good fruit and bud-hardiness to cold.

Correlated Characters. — Fruit breeders use correlated characters in judging the value of seedlings without fruiting them. To illustrate, peach leaves indicate the color of flesh of the fruit. Yellow-fleshed varieties have leaves of a yellow hue. Delaware grapes have a compact bunch and short internodes. White blackberries have light-colored foliage. Grape varieties with pollination troubles have reflex stamens. It is an interesting assignment to make out a list of all the correlated characters you can find for our fruit plants.

CHAPTER XIII

FRUIT STUDY OF GRAPE VARIETIES

The growing of grapes for the fresh fruit is only a part of the grape industry. Raisins, grape juice, and dried currants (small seedless grapes), represent a large part of the business. This fruit is grown from Mexico well into Canada. There is a long list of varieties, many times more than we can find time to study. (Hedrick claims about two thousand in America and four thousand in Europe.) We shall therefore study and compare a few common varieties. This will help us to become acquainted with other varieties as we meet them.

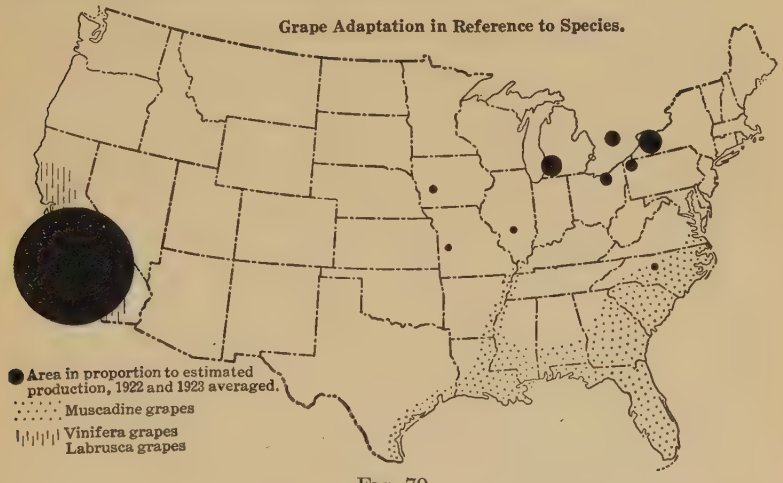

Grape Adaptation in Reference to Species.
Area in proportion to estimated production, 1922 and 1923 averaged.
Muscadine grapes
Vinifera grapes
Labrusca grapes

FIG. 70.

Size of Bunch. — The fresh grapes displayed at fruit stands during midwinter are usually European, vinifera, or wine grapes. The common grape of the northeastern United States and adjoining parts of Canada is called fox grape or labrusca grape. This grape is called bunch grape in the southeastern part of our country, to distinguish it from the Muscadine

grape, which often produces berries singly or only a few in a bunch. By comparing a few clusters, we soon see that their size varies greatly. Some European varieties have very large clusters, as is often illustrated by the Tokay and Malaga grapes at the corner fruit stand. The opposite extreme is the small whitish table grapes often found on the Chicago market in midsummer or those of Winchell (Green Mountain), the early white grape of our gardens. These varieties have clusters about four or five inches long and are very little larger, both in bunch and berry, than the Delaware grape of our gardens. Brighton and Niagara have about as large a bunch as any of our eastern-grown grapes. Some of the larger clusters of Brighton may be nearly a foot long and half as wide. Winchell (Green Mountain) has a small, loose cluster which is one of its greatest faults.

Shape of Cluster. — Artists usually represent a cluster of grapes as large near the stem end and tapering nearly to a point at the other end. This is the more common form of cluster among grapes. Brighton, Niagara, and Concord usually have tapering clusters. This tapering form is due to the fact that the main stem of the cluster branches near the base to form one or more secondary clusters. A cluster so formed is said to be " shouldered "; it may be either single or double shouldered. Cylindrical clusters are also common among grapes. Lindley, Pocklington, and a considerable percentage of Delaware clusters are shaped like a cylinder. As a rule, cylindrical clusters are not shouldered.

Compactness of Cluster. — Perhaps almost as important as the actual shape of the cluster is compactness. Delaware has a firm cluster. Niagara cluster is better than the average. Winchell (Green Mountain) cluster is about as loose as that of any prominent variety. The cluster of Moore tends to be loose. Concord and Worden are about average in cluster characters. Compact clusters sell much better than loose ones. A firm cluster is usually accompanied by either a short peduncle or short pedicel. A pedicel is a short stem to which the individual berries are attached. The pedicel is

FIG. 71.

Upper: James variety of Muscadine grape. The leading variety of Muscadine grape. *Courtesy of M. E. Gardner.*

Lower: Niagara grape vine loaded with fruit. The large, handsome clusters contrast strikingly with the James variety above. Niagara is the leading white grape of northeastern United States and Canada.

attached to the main stem of the cluster or shoulder by another short stem called the peduncle. Many varieties have a number of small warts on the pedicel.

Color of Grapes. — Blue or blue-black is the preferred color for grapes. This is especially true of grapes used for making grape juice. Green or white grapes will make good grape juice, but it is clear and not attractive. Brighton, Delaware,

Fig. 72. — A cluster of Worden grapes cracked following a rain. This is not an uncommon phenomenon in fruit and is especially common among labrusca grapes. This makes many clusters unsaleable. Honey bees like to feed on the juice after the berries have cracked.

and Lindley are common varieties of red grapes. Clusters of Black Hamburg are often imported and found on our eastern markets. James, the leading variety of Muscadine grapes, is black. Niagara is the leading variety of green or white grapes grown in eastern North America. The color of grapes, like the color of most of our fruits, is very much modified by the bloom. Grape bloom varies in amount and is usually waxy. Campbell has a very heavy bloom. The bloom on Catawba is only moderate, while that on Winchell

(Green Mountain) is quite thin. Many attribute color to grape bloom, but perhaps that is only because the color of the berry shows through the bloom.

Size and Shape of Berry. — James and many other varieties of Muscadine grapes have large berries. The berries of Tokay and Malaga grapes are large and oblong. Most of our labrusca grapes are inclined to be round. Eaton is quite large in size of berry. Winchell and Delaware have small berries. Worden berries are a little larger than Concord berries and both are above average in size.

Skin. — Many varieties of our labrusca grapes when nearly ripe have a tendency to crack after a heavy rain. This is a common failing of Worden. Most people prefer to eat a thin-skinned grape. The skin of Winchell is thin and tender. Catawba has a thick, tough skin. Muscat and Tokay grapes have very thick skins. Sultanina has a very thin skin. In the process of raisin and currant making, grapes are often dipped in lye, to hasten drying by cracking (checking) the skin. Thick-skinned varieties require longer treatment than thin-skinned ones. The skin usually clings to the flesh in vinifera grapes. Labrusca grapes often have a pigment layer just under the skin. Most persons do not eat the skin of labrusca grapes, for it is often astringent. The student may discover this for himself by chewing the skin of Campbell, or of some other labrusca grape. Most varieties of Muscadine grapes have a very thick skin.

Flesh. — Labrusca and vinifera grapes have very different types of flesh. This is well illustrated by comparing the meaty flesh of Malaga with the juicy flesh of Concord. Many of our eastern varieties have a translucent, greenish-yellow flesh, although sometimes tinged with red. Winchell has a very tender flesh, while that of Campbell is tough and coarse, especially if picked before it is fully ripe.

Flavor and Quality. — The labrusca grapes are usually more refreshing to eat than the vinifera. We usually attribute this to the foxy flavor. Most Europeans do not like this foxy flavor when they first taste grapes like Concord and Catawba;

but most Americans enjoy it, provided it is not too strong. As a rule, varieties like Niagara and Concord contain less sugar than the wine grapes of Europe, of California, and of our conservatories. Perhaps this is one reason why the former seem more refreshing. Grape flavor is often described as vinous, or wine-like. A grape that is pleasantly subacid is said to be sprightly in flavor. Delaware is about the best flavored of our fox grapes. We call Delaware vinous, sprightly, and spicy (aromatic) in flavor. Both Concord and Catawba have a pleasing amount of foxiness. Wyoming has about as strong a foxy flavor as any variety in cultivation. The wild grapes now growing over New England are usually quite foxy, but often less so than Wyoming.

Seeds. — Number of seeds and proportion of flesh to seeds is an important commercial character in a variety of almost any fruit. Thus, some people insist that Delaware is too seedy. Seedlessness is not uncommon among grapes, as is illustrated by the currant grapes (dried) of commerce and the seedless Muscats or "shot" grapes. Varieties like Campbell, Winchell, and Delaware contain from one to four seeds per berry. Grape seeds have two marks, called the raphe and the chalaza, which, together with number, size, and shape of seeds, are useful in distinguishing varieties. The chalaza is a small mound-like enlargement on the rounded side of the seed, and marks the point where the nuclear and integumental tissues are connected. The raphe is the small ridge extending from the chalaza toward the upper end of the seed. The raphe is formed by the fusion of the filament that attaches the ovule to the ovarian wall, with the outer seed coat. The raphe may be distinct or indistinct, and the chalaza above center or below center.

Keeping Quality. — Vinifera grapes are usually much better keepers than fox grapes. If a cluster of Niagara or Worden grapes is kept in a cool, moist place for several weeks, and then given a slight shake, most of the berries will drop off (shell). The berries will still be in good condition, but hardly salable, as the brush, or fibrovascular

bundle, that attaches the berry to the pedicel will have broken. Campbell and some of our labrusca-vinifera hybrids do not shell as much as varieties like Worden and Eaton. If we could only develop varieties of fox grapes that would not shell, the season and market would be greatly extended.

The brush mentioned above is a good character to use in recognizing varieties. Campbell has a blood-red brush, Moore faintly pink, and Worden yellowish.

BRIEF NOTES ON SOME GRAPE VARIETIES

Northern-grown Varieties, — Labrusca and Labrusca Hybrids

Good Points	*Bad Points*

Brighton

V. labrusca, vinifera

Origin: By Jacob Moore of Brighton, N. Y.
Diana Hamburg and Concord were its parents.

Large clusters.	Loses sweet flavor rapidly after picking.
Handles well.	Dull reddish color.
High quality when fresh.	
Berries comparatively free from cracking and do not shell badly.	

An attractive variety for home use and local markets. Should be planted with another variety to insure pollination.

Campbell (*Early*)

V. labrusca, vinifera

Origin: By Geo. W. Campbell of Delaware, Ohio.

Early-ripening.	Berries color before ripe, giving the variety a reputation for poor quality.
Large berries.	Berries variable in size.
Good keeper.	
Good shipper — does not shell badly.	

Widely grown, but only to a limited extent.

Good Points	*Bad Points*

Catawba

V. labrusca, vinifera

Origin: Uncertain.

Late keeper — one of the best of this group.	A red grape.
Good shipper.	Late ripening, too late for New England, Canada, and similar sections.
High quality.	Often picked before fully ripe.
The leading variety of this group for wine.	

A leading red grape of our markets. One of the first varieties of native grapes to be cultivated extensively.

Concord

V. labrusca

Origin: By Ephraim Bull of Concord, Mass.

Fair-sized, attractive berry and bunch.	Some object to the foxy flavor.
Good in quality, especially as a table grape and for juice.	Not a good keeper.

The leading labrusca grape of North America. Heavily planted from British Columbia to southern New England. Over one-half the new plantings of Canada are Concord. Concord excels in plant characters also.

Delaware

V. labrusca, bourquiniana, vinifera

Origin: Near Delaware, Ohio.

Standard dessert quality.	Small size of berry.
Ships and handles well.	Red grape.
Distinctive, attractive fruit.	
Well-known.	

A splendid fresh fruit variety that often sells at a premium. Planted to a limited extent commercially and for home use.

Good Points	*Bad Points*

HERBEMONT

V. bourquiniana

Origin: Uncertain.

Attractive glossy black color.	Small berry.
Good quality, especially as a table grape.	Requires long season and warm climate.
Well-known in southern United States.	

The leading " bunch " grape variety of the South. Grown to some extent in southern France.

MOORE (*Early*)

V. labrusca

Origin: By Captain John B. Moore of Concord, Mass.

High quality for an early-ripening variety.	Shells considerably.
Attractive cluster and berry. Blue in color.	Sometimes cracks in unfavorable weather.
Well-known.	

Considered by many the best early commercial variety. Ability to ripen in a short season recommends this variety to some sections.

NIAGARA

V. labrusca vinifera

Origin: Niagara County, New York.

Large, attractive clusters and berries.	Shells badly.
Good in quality.	Green color.

The leading labrusca variety of green grapes. Still heavily planted.

WINCHELL (*Green Mountain*)

V. labrusca, vinifera, æstivalis

Origin: Vermont.

High dessert quality.	Small size of berry.
Early ripening.	Loose cluster.
	A green grape.

A good variety of green grapes for home plantings.

Good Points *Bad Points*

Worden

V. labrusca

Origin: By Schuyler Worden of New York.

Matures in a short season.	Shells and cracks badly.
Good quality.	Keeps poorly.
Attractive bunch and berry.	

Preferred commercially where the growing season is a little short for Concord. Often sold for Concord. A good variety for home plantings.

Muscadine Grapes

James

Origin: North Carolina.

Large, attractive fruit.	Lacks richness for juice purposes.
Medium dessert quality and good culinary quality.	
Handles well.	

Considered by many the leading variety of this group.

Scuppernong

Origin: Probably near Scuppernong River.

High dessert and culinary quality for a variety of this group.	Probably would not ship well.
Well-known.	Greenish-yellow color.

More widely grown than any other variety of this group.

Thomas

Origin: Near Marion, South Carolina.

High dessert quality.	Ripens unevenly.
Highest sugar content of the Muscadine varieties.	Drops as soon as ripe.

A good variety for home plantings and local use.

Vinifera Grapes

Good Points	*Bad Points*

Alexandria (*Muscat of Alexandria*)

High quality, as a table grape.	Thick skin.
A good raisin grape.	First crop partly seedless (shot grapes).
Very productive.	

Commonly called Muscat. Dried to form the seedless Muscat raisins of commerce. Competes with Sultanina for first place among raisin grapes.

Alicante Bouschet

Origin: France, by M. Bouschet de Bernard.

Deep color.	Juice loses color on standing.
Abundant crops.	Claimed to be short-lived on certain stock.
Very good shipper.	Does poorly on very heavy soils.

This variety ranks high among wine grapes in France and Algeria, as well as in California. Now often used in making red grape juice. Zinfandel is also a popular variety for wine making.

Black Corinth (*Zante Currant*)

Seedless fruit.	Requires girdling.
High yields.	Sometimes berries develop seeds.
Good shipper.	

Dried to form most of the currants of commerce. The leading variety for this purpose.

Emperor

High dessert quality.	Irregular bearer in some sections.
Good shipper.	Requires a long season to mature.
Keeps well.	Loose bunch.

Ranks about fourth among vinifera varieties (fresh fruit) found on our markets.

Good Points	*Bad Points*
Malaga	
Good shipper.	Poor color.
Good quality.	
Large bunches.	
Good keeper.	

Ranks about first among fresh fruit vinifera varieties of grapes.

Sultanina (*Thompson Seedless*)	
Perfectly seedless.	Lacks flavor.
Very vigorous.	
Heavy producer.	
Low in acidity.	

Popular in both California and Asia. Production of this variety has increased in recent years. Rose Sultanina (a colored form) is a well-known table grape. Sultanina promises to be the most popular vinifera variety of the Pacific Coast.

Tokay (*Flame Tokay*)	
Attractive color.	Thick skin.
Very large bunches.	Only good in quality.
Good shipper.	
Vigorous, productive vines.	

A well-known red grape on the markets of eastern North America. This variety ranks high among vinifera grapes shipped to distant markets.

QUESTIONS

1. What do you understand by the term "foxy" as applied to grape flavors?

2. What are "shot grapes," and how is it possible for such fruits to be grown? Do shot grapes occur in varieties like Worden and Brighton?

3. Explain the terms "crack" and "shell" as applied to grapes. Name a variety that cracks and shells badly.

4. Name a variety of labrusca (or hybrid) grapes that: (*a*) has a blood-red brush; (*b*) has pollination troubles; (*c*) has good keeping quality; (*d*) colors before ripe; (*e*) has oblong berry; and (*f*) has sweet flavor.

5. Name the leading: (*a*) "bunch" grape of southern United States; (*b*) vinifera table grape of North America; and (*c*) labrusca grape.

6. Compare vinifera, muscadine, and labrusca grapes as to: (*a*) production per acre; (*b*) table grape qualities; (*c*) grape juice qualities; (*d*) shipping and keeping qualities; and (*e*) wine-making qualities.

7. Name two hardy, short-season varieties of labrusca grapes that are blue in color.

8. Explain the terms "raphe" and "chalaza" as applied to grapes.

REFERENCE READINGS

Fraser, Samuel, "American Fruits," pp. 833–838, 1924.

Hedrick, U. P., "The Grapes of New York," 1907.

Young, W. J., "Muscadine Grapes, Culture and Varieties," South Carolina Agricultural Experiment Station, Bulletin 205, 1920.

"Descriptive Catalogue of California Grapes," State of California, Department of Agriculture, Special Publication Number 25, 1922.

"Juice Grape Varieties (California's most important)," California Grape Grower, 1924.

CHAPTER XIV

THE BRAMBLE FRUITS

Many of the troubles that are encountered in variety plantings of the bramble or cane fruits are due to the fact that these fruits are badly mixed in many of our nurseries. Perhaps one of the reasons for their having become mixed is that a given variety is likely to vary greatly under different environments. The dewberry is but a trailing blackberry, and the two grade into each other. The Loganberry, long considered a distinct kind of fruit, is now known to be a blackberry, the trailing blackberry of the Pacific Coast. Perhaps some of the readers of this book have compared Eldorado plants grown in partial shade with those of the same variety grown in full sunlight, and noticed how they differ as to both plant and fruit. Leaving these vexing problems to a later chapter on Classification, we shall now study the varieties of bramble fruits, both from stored fruit and as we find them growing over the country.

RASPBERRY VARIETIES

The raspberry varies considerably in size and shape. Cuthbert and Ruby are quite conical. Herbert and Columbian are nearly round to broadly ovate. Many of the black raspberries are really hemispherical in shape, although Cumberland is conical. Size is not a very constant character in raspberry varieties. As a rule, our everbearing varieties like Ranere (St. Regis) tend to average small. Herbert, Columbian, and Scarff are inclined to grow large. This is rather important from the grower's point of view since the buying public prefer large berries.

Color. — Few characters are more striking or more important than color in raspberries. There are four classes:

reds, purples, blacks, and yellows; and there are marked variations in shade of color under each class. Thus, Herbert and Perfection are dark red, while Ranere and June are light red. The purples vary from a dull red to purplish black. Perhaps we should expect this, since they are a cross between reds and blacks. Buyers often mistake

FIG. 73.

1. A drupelet of the raspberry variety, Herbert.
2. A drupelet of Ruby.
3. A drupelet of Columbian.
4. Hemispherical form, variety Ranere (St. Regis).
5. Conical form, variety Ruby.

Shade of color, size of drupelets and berry forms help us to recognize varieties of raspberries and blackberries from the fruit. Soft fruited varieties often have large, fleshy drupelets. The bright red color of Ranere is a great asset in selling compared with dull colored varieties.

purples for overripe red raspberries. Caroline is an orange-pink variety supposed to have been produced by crossing reds on yellows. Black raspberries or blackcaps vary from a shiny to a dull black. A heavy bloom will often give the fruit a dull black appearance. Cumberland and Kansas are glossy black varieties, while Gregg and Plum Farmer are not so glossy.

Drupelets. — Both raspberries and blackberries are made up of many small parts called drupelets. If we examine a drupelet, we find that it consists of skin, some juicy flesh, and a single seed. The size of the drupelet is a good distinguishing character among bramble fruits. Cuthbert and Ruby have small drupelets; Ranere, Columbian, and Gregg have large ones. The drupelets separate readily, or crumble, in some varieties. This is especially true of the variety Perfection and is a rather serious fault. In order to form a clear idea of the different fruit characters, the student should select a number of firm-fruited varieties and compare them with several soft varieties. We sometimes find soft flesh and large drupelets correlated, although not always.

Receptacle. — The receptacle, or torus, is the fleshy center of a blackberry and the fleshy stem on which the raspberry grew. The ease with which the berry may be separated from the receptacle interests growers because of its effect on rate of picking and condition of the fruit after being picked. Cumberland and Loudan separate readily from the receptacle, while Perfection clings tenaciously.

Flavor and Quality. — Few varieties equal Cuthbert in flavor. Ranere is considered almost insipid. Columbian is quite spicy or aromatic. June is mildly subacid. Cumberland is sweeter than Kansas, and Gregg is more juicy than Kansas.

Plant Characters. — Of all the plant characters, raspberry growers are especially interested in productiveness and hardiness to cold. Thus, Cuthbert is considered only a moderate producer. Herbert is considered a somewhat better producer than Cuthbert by many growers in the eastern part of the United States. Antwerp is considered a heavy producer on the Pacific Coast. Herbert and Cuthbert have long been considered hardy varieties. Some consider Herbert much the hardier of the two. Kansas is classed among the less hardy of the blackcaps.

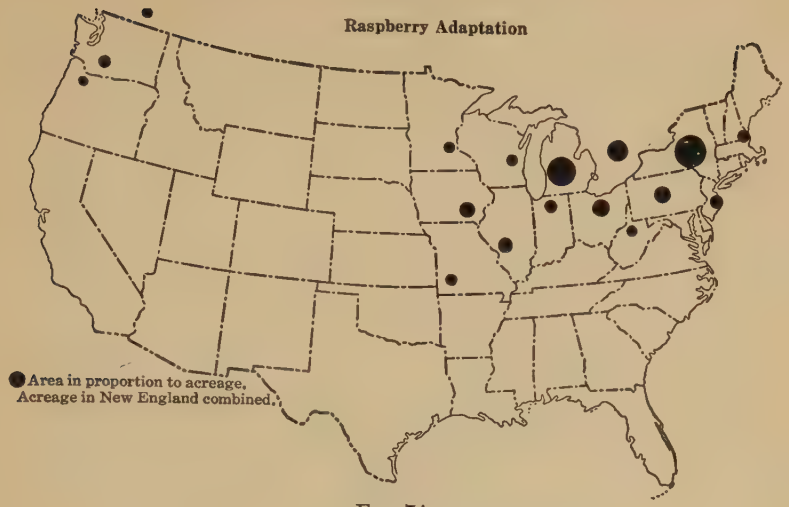


FIG. 74.

NOTES ON RASPBERRY VARIETIES

	Size of Berry	Firmness of Flesh	Freedom from Crumbling	Attractiveness of Fruit	Quality	Production	Hardness to Cold
Reds							
Cuthbert	7	9	9	8	10	8	9
Marlboro	9	9	9	9	8	9	8
Antwerp	8	7	9	8	9	9	3
June	9	9	9	9	9	9	8
Herbert	9	5	9	9	8	9	9
Perfection	6	7	1	8	7	9	9
Ranere	4	9	6	7	1	8	8
Purples							
Columbian	9	9	9	7	9	10	8
Shaffer	10	8	9	7	8	9	9
Blackcaps							
Plum Farmer	9	9	10	9	8	8	9
Gregg	9	9	10	9	8	8	7
Cumberland	9	9	10	9	8	8	9
Yellows							
Golden Queen	7	9	9	6	10	8	9

A score of ten indicates that the variety is among our best as regards the character in question. Smaller scores indicate lower rank.

Cuthbert is the leading mid-season variety of red raspberries both for the market and for canning. June is a

promising early red raspberry, competing with Marlboro. Ranere (St. Regis) is a double-cropping variety which is finding a limited place in home plantings and for local markets. Columbian is the leading variety among the purples, and is especially prized for canning. Golden Queen is desirable as a yellow variety for home plantings and local markets. Surprise is the leading commercial variety of California, although too tender to cold for many sections.

FIG. 75. — Frozen Cuthbert raspberries for class study. Most of our perishable small fruits, including cherries, can be kept at 10° F. or lower and studied during the winter months. Flavor and appearance are nearly the same as when picked. The author has used raspberries, blueberries, currants, blackberries, strawberries and cherries preserved in this way.

BLACKBERRY AND DEWBERRY VARIETIES

The fruits of blackberries and dewberries can easily be studied together, for they are, structurally speaking, alike. In addition, they have hybridized so readily that the varieties grade from one to another. In studying these fruits, we shall have to remember that environment exerts a profound effect both on fruit and plant. One may convince himself of this by comparing berries grown in partial shade with those grown in full sunlight. As a rule, the shade-grown berries are larger and softer fleshed. Berries

grown in a moist location look very different from those of the same variety grown in a dry location. It is claimed that thorniness of the canes varies with the amount of sunlight, temperature, and humidity of the air.

With the above facts in mind, the student should examine a number of varieties of blackberries and dewberries. Here, as in raspberries, we note striking differences in size of drupelets. They are comparatively small in Early Harvest and large in Eldorado and the Mayes dewberry. Most of our cultivated varieties have comparatively large fruit. Usually, the dewberries, including the Loganberry, are larger-fruited than blackberry varieties. Early Harvest and Snyder are medium in size when compared with large-fruited varieties like Eldorado and the Loganberry. Agawam is too small for a good commercial berry, and Mammoth is sometimes two inches long.

Blackberry Shapes and Colors. — Early Harvest and Mersereau are conical, or "thimble-shaped." A common form is that of the Lucretia dewberry, Erie, and Kittatinny, which are cylindrical, or elongated hemispherical. A glossy black is the preferred color of this class of fruit, although the Loganberry is a red form. Most of our cultivated varieties at least approach this ideal. Snyder tends to turn reddish on standing after picking.

Flesh Characters. — The flesh of blackberries and dewberries is composed of the tissue in each drupelet and the core tissue. From a dessert and culinary point of view, a soft core is to be preferred. Lawton will serve as an illustration of a rather hard-cored variety. Snyder will illustrate varieties having firm-fleshed drupelets. This character has caused Snyder to be considered about the best variety in shipping quality.

Flavor and Quality. — Among the several characters that have caused the remarkable success of the Loganberry, flavor stands high. This is especially true of the Loganberry juice used for the soda fountain trade. Of all our varieties of blackberries, Snyder is about as poorly flavored as any.

Eldorado ranks high in quality and flavor. Degree of ripeness has a marked effect on flavor. Most varieties are briskly acid if not fully mature, although mild and sweet if fully ripe.

Plant Characters. — Next to ability to produce, resistance to cold is the most important of the plant characters. Perhaps, for some sections like New England, resistance to cold is of first importance. The dewberry is essentially a fruit of our warmer sections. Many of the varieties will have their canes killed by temperatures much below zero. This is especially true of the Loganberry type of dewberries. Snyder has long been considered a very hardy variety, but Eldorado, Mersereau and Taylor are quite hardy. In our southern sections, resistance to rust is an important requirement of any variety. Early Harvest and Kittatinny are offenders in this respect.

In the wild state, many blackberry and dewberry plants tend to produce impotent pollen. Double blossoming is not uncommon among the dewberries. The former is a factor under production, especially with dewberries and dewberry hybrids. The latter results in sterility.

NOTES ON BLACKBERRY VARIETIES

Good Points	*Bad Points*
Early Harvest	
Origin: Illinois.	
Earliest blackberry.	Tender to cold.
Very productive.	Susceptible to rust.

Grown to some extent in California and the South.

Eldorado	
Origin: Ohio.	
High quality.	Winter-killed in the coldest sections
Hardy to cold.	and somewhat troubled with rust
Free from rust (comparatively).	in the extreme South.
Very productive.	

Long a popular mid-season berry. A leading commercial variety and good for home plantings.

Good Points	*Bad Points*

ERIE

Origin: Ohio.

Hardy to cold.	Turns black before ripe, resulting in reputation for poor quality.
Very productive.	
Large, attractive fruit.	
Free from rust.	

ICEBERG

Origin: California.

A white blackberry.	Only half hardy.
Very productive.	Sells poorly.
Good quality.	

An interesting fruit for home plantings and as a novelty only.

KITTATINNY

Origin: New Jersey.

High quality.	Only half hardy.
Attractive fruit.	Susceptible to rust.
Productive.	

Well-known and found in many home plantings. Limited adaptation commercially.

LAWTON

Preferred for canning.	Only half hardy.
Good quality.	Susceptible to rust.
Productive.	

Grown in certain sections for canning.

MERSEREAU

Origin: New York.

Vigorous grower.	Hard to propagate.
Large, attractive fruit.	Susceptible to rust.
High quality.	
Hardy.	
Considered drought-resistant.	

Mersereau is grown commercially in the eastern and north central sections of the United States.

FIG. 76.

Left: Snyder Blackberry.
Right: Eldorado Blackberry.
Note the small drupelets of Snyder in comparison with those of Eldorado. This seems to be one of the best distinguishing characters among bramble fruits. The large drupelets of Eldorado make the berry more juicy and fleshy than the berry of Snyder.

Good Points	*Bad Points*
SNYDER	
Origin: Indiana.	
Very hardy.	Poor quality.
Healthy and productive.	Not as attractive as some varieties.
Fruit handles well.	

Still widely grown as a commercial variety, but its popularity is rapidly declining. Adapted to poor, light soils.

TAYLOR	
Ripens late.	Only a moderate producer.
Good quality.	
Hardy to cold.	
Vigorous grower.	

Widely grown as a late-ripening variety.

MAMMOTH	
Origin: California.	
Very large fruit.	Fruit soft.
High quality.	Tender to cold.
Productive.	

This blackberry-dewberry hybrid is widely distributed in home plantings on the Pacific Coast and is grown for local markets. Its foliage is semi-evergreen.

NOTES ON DEWBERRY VARIETIES

Good Points	*Bad Points*

Lucretia

Origin: West Virginia.

Large, attractive fruit.	Subject to anthracnose and double blossom.
Adapted to wide range of conditions.	
Productive.	

Perhaps the best-known variety of dewberry in the eastern two-thirds of our country.

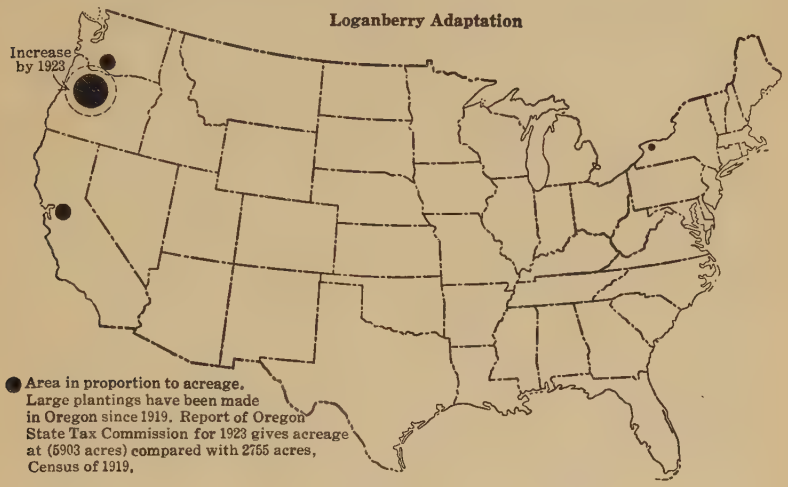

Loganberry Adaptation
Increase by 1923
Area in proportion to acreage. Large plantings have been made in Oregon since 1919. Report of Oregon State Tax Commission for 1923 gives acreage at (5903 acres) compared with 2755 acres, Census of 1919.

Fig. 77.

Loganberry

Origin: California.

Many uses for the fruit.	Limited adaptation (See outline map).
Attractive fruit.	
Heavy production.	

The growth of the Loganberry industry is one of the remarkable developments of recent years. Adapted to Oregon and neighboring sections, the variety is winter-killed in colder regions. The canes are too brittle to be laid down and covered easily. Loganberry is usually a poor producer in southern sections.

Good Points	*Bad Points*
Mayes	
Origin: Texas.	
Early ripening.	Too soft to ship readily.
Productive.	Subject to anthracnose and double blossom.
High quality.	
Attractive fruit.	

The leading variety in Texas.

QUESTIONS

1. Which of the following varieties of red raspberries have small drupelets: Marlboro, Herbert, Ranere, Cuthbert, Ruby, June?
2. What factors limit Loganberry adaptation?
3. What fruit characters enable Snyder blackberry to ship and handle well?
4. Compare purple to red raspberries as a fruit for a roadside stand.
5. What characters enable Cuthbert to be the most popular red raspberry variety of North America?
6. Name a variety of red raspberry that is noted for hardiness to cold.
7. If the "cold pack" method of preserving raspberries should replace drying and canning for the bakery trade, what effect, if any, would the change have on our choice of varieties?

REFERENCE READINGS

Card, F. W., "Bush Fruits," pp. 147–232, 1917.

Darrow, George M., "Blackberry Growing," United States Department of Agriculture, Farmers' Bulletin 1399, pp. 14–16, 1924.

Darrow, George M., "Culture of the Loganberry and Related Varieties," United States Department of Agriculture, Farmers' Bulletin 998, 1918.

Darrow, George M., "Dewberry Growing," United States Department of Agriculture, Farmers' Bulletin 1043, pp. 16–17, 1924.

Hartman, Henry, "The Cane Fruit Industry in Oregon," Oregon Agricultural Experiment Station, Circular 48, 1923.

CHAPTER XV

STUDY OF STRAWBERRY VARIETIES

Strawberry varieties, unlike apple varieties, have changed rapidly. Perhaps the changes have not been more rapid than the development of the strawberry industry, which in 1860 existed only in the form of home plantings, and now occupies relatively large areas and deals in carload shipments. Variety adaptation is also very striking. Thus,

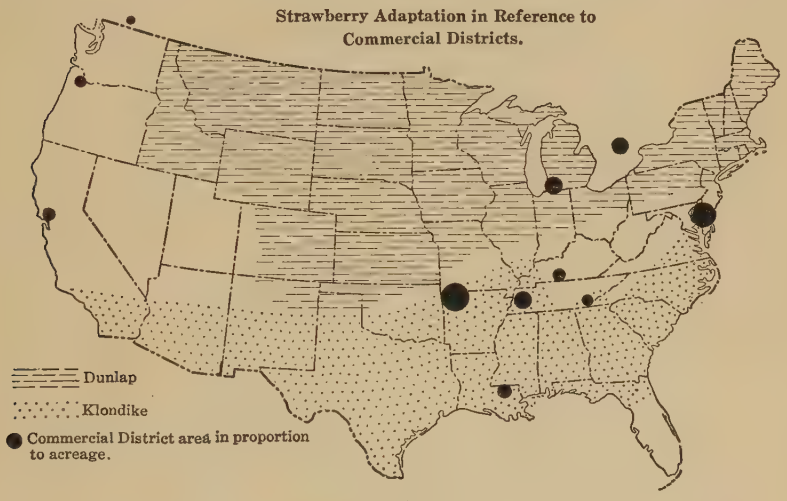

Strawberry Adaptation in Reference to Commercial Districts.
Dunlap
Klondike
Commercial District area in proportion to acreage.

FIG. 78.

Parsons is the leading variety at Selbyville, Maryland, and Superior is preferred at Bridgeville, only twenty-five miles away. Most growers have ceased to quarrel with their neighbors because the latter prefer to grow a different variety, although the plantings may be only a few rods apart.

Strawberry Adaptation. — Perhaps climate is the greatest factor in variety adaptation. None of our southern varie-

ties have really thriven on our trial plots in New England. Neither would the New England varieties be expected to thrive in Florida. The common failing of northern varieties when taken south is to develop leaf spot, and some are said to become too soft to ship. On the other hand, Missionary is considered a firm berry in Florida and too soft when grown farther north.

Strawberry varieties seem to have a decided preference for certain kinds of soil. Klondike prefers a light soil and Gandy a heavy soil, while Aroma thrives on the heavy loams. Marshall and Belt grow best on rich, fertile soils. Chesapeake thrives under irrigated conditions in the northeastern part of the United States.

The accompanying maps give some idea of the regions to which a few of our leading varieties are best adapted. The selection of really superior varieties, that are well adapted to the section in which they are to be grown, is a very large factor in the development of commercial districts. Commercial districts, from the standpoint of either acreage or production, are subject to fluctuations from year to year. This is more true of strawberries than of any other fruit, for the strawberry is a short-lived plant.

Strawberry Shapes. — Only a few of us will have a chance to study many strawberry varieties as they ripen in the field. Splendid variety supplies of nearly all of our small fruits can be secured by storing them at about 10° F. The fruit can then be studied as it thaws out, and will have most of the appearance and flavor of the fresh fruit.

Almost any eight or ten varieties of strawberries may be selected for the study of variety differences. If specimens of the several varieties are placed in a row on the table, differences in shape will be apparent. A single box of some varieties will contain specimens of several shapes. The student will have to select the shape that is commonest in each variety. Conical or long-conical strawberries are preferred by many growers. Premier is a good illustration of a long-conical berry. Wedge-shaped strawberries are

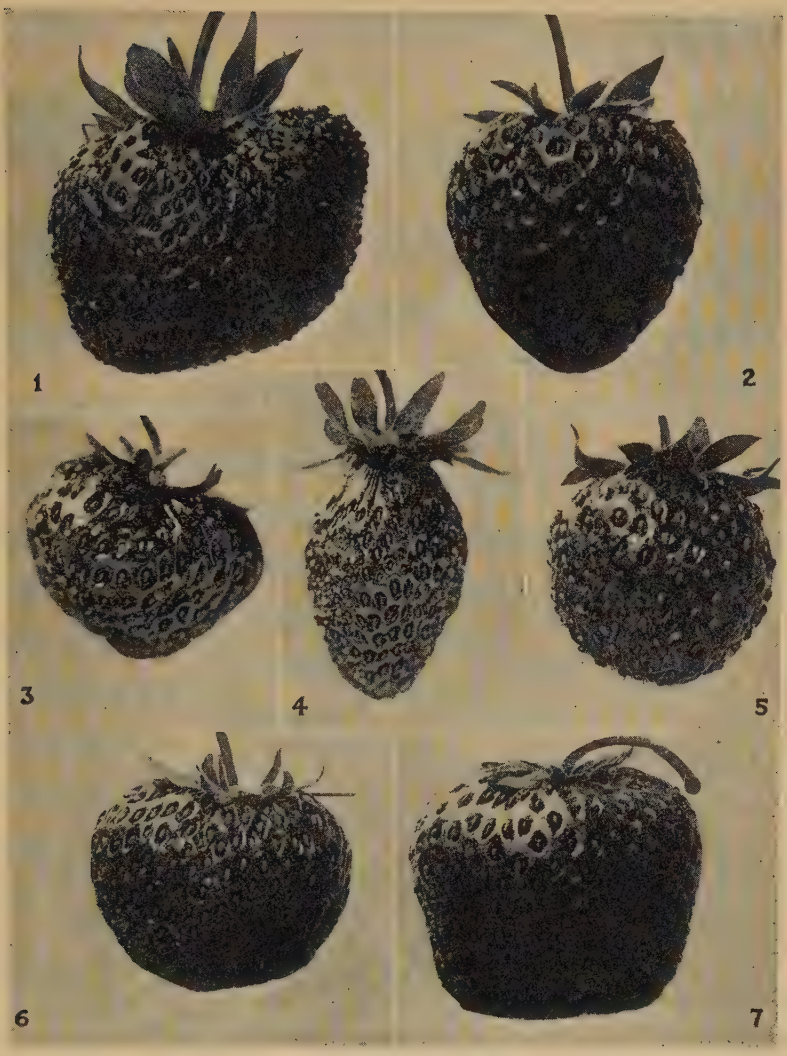


FIG. 79.

1. Cockscomb (Var. St. Martin).
2. Conic (Var. First Quality).
3. Oblate (Var. Meteor).
4. Necked (Var. Heritage).
5. Round (Var. Meteor).
6. Roundish Wedged (Var. Bliss).
7. Wedged (Var. Bouquet).

quite common; they are often found in the William Belt variety. Round or globose berries are considered desirable in form, and some varieties are even flat or oblate. The accompanying illustrations will help to make strawberry shapes clearer.

Color. — Differences in color are almost as striking as differences in shape. Charles I is a light crimson berry. Klondike is a deep crimson. The difference may be noted

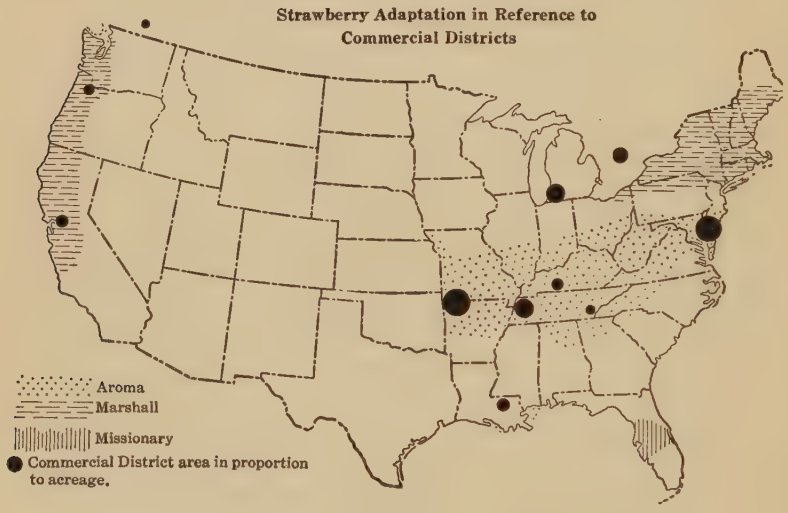


FIG. 80.

when the berry is cut in two: the Klondike is deep crimson to the center; Charles I has a center that is almost white. Canners and discriminating buyers do not like white-centered berries. The color of the inner flesh varies fully as much as the surface color, if not more. Again, some varieties are a dull red, while others are bright and glossy. Glossy red berries sell best.

Seeds. — Seeds are very prominent in some varieties. They are raised on St. Martin and thus protect the berry in shipment. In Premier, the seeds are sunken. Most varieties have yellow seeds, but some have brown. Yellow seeds are more attractive than brown.

Size and Shipping Quality. — The size of the berries differs greatly with the conditions under which they grew. Joe and Belt should be large, while Dunlap is about medium. As a rule, medium-sized berries are better shippers, but a retail trade will prefer large berries. Texture and firmness differ with growing conditions. Some varieties are too soft to sell even at roadside stands, while others can be shipped hundreds of miles. Aroma is usually a firm berry and Sample tends to be soft. Wet weather and spring applications of nitrogen tend to make the berries softer.

Flavor and Quality. — Flavor and quality are important commercial characters. Marshall is nearly the standard for quality in New England, and sometimes sells at a premium. Aroma is not nearly as good, and Klondike is only of fair quality. Most of our important varieties are more or less subacid, although Klondike is sometimes listed as acid. The so-called " fig strawberries " are sweet.

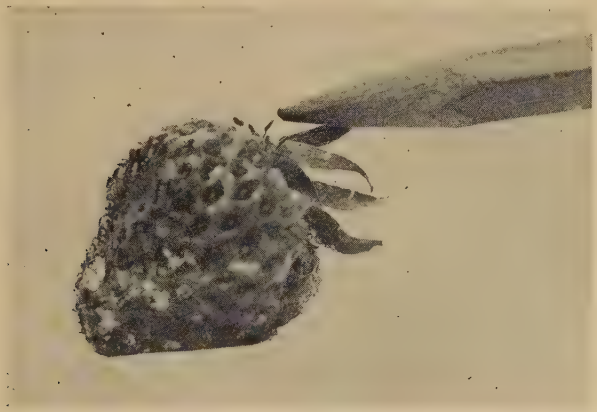


FIG. 81. — The pencil points to stamens just under the hull of the strawberry (Dunlap). Pistillate or imperfect varieties have few or no stamens.

Plant Characters. — From the point of view of the grower, plant characters are about as important as fruit characters. Thus, Marshall is quite subject to leaf spot. Injury to foliage is accompanied by many other failings, such as reduced yields, few runners, and winter killing. The variety

Sample has imperfect blossoms; the absence of stamens at the base of the berry should be noted in the study of this variety. Many growers in New England prefer a variety having a tall, erect fruiting stem, as this enables them to use less mulch and still avoid sandy berries.

Season of ripening is quite important in many ways. Premier(Howard) has a long fruiting season, requiring many pickings; but, unlike many varieties, it continues to produce berries of fair size until the end of the season. Minute Man is an old variety which tends to form few runners, while Bliss is an example of the opposite extreme. The number of runners makes considerable difference with planting distances and methods of handling.

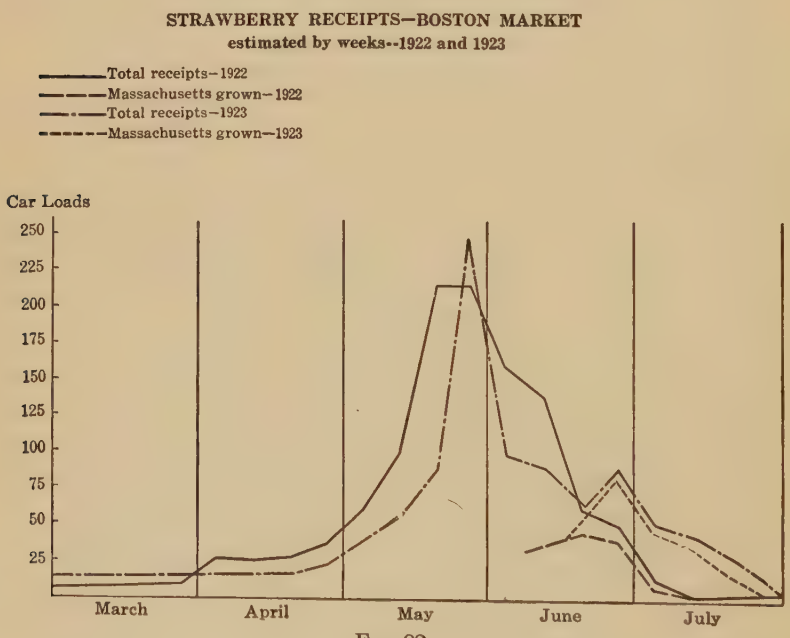


Fig. 82.

Market Demand. — In selecting varieties for a given location, it is often of considerable importance to study the strawberry supply on the local market. This will vary considerably from year to year, but will help the grower

to choose among early, mid-season, and late varieties. Many strawberry growers near Boston find their late varieties in strong demand. This is suggested by a study of the strawberry supplies on that market.

SUMMARY OF VARIETY NOTES FOR A FEW VARIETIES OF STRAWBERRIES

Good Points	*Bad Points*
KLONDIKE	
Origin: Louisiana.	
Firm.	Only fair quality.
Makes quick start in spring.	Averages small toward end of season.
Resistant to southern diseases.	
Adapted from Virginia to Florida.	
AROMA	
Origin: Kansas.	
Attractive.	Not adapted to light soils.
Good shipper.	
Productive.	
Grown especially in Kentucky and just north of the region to which Klondike is best adapted.	
DUNLAP	
Origin: Illinois.	
Resistant to cold and drought.	Only medium shipper.
Productive.	Susceptible to leaf spot in South.
Well-known.	
High culinary quality.	
Grown in most sections of the northern United States.	
GANDY	
Origin: New Jersey.	
Late-ripening.	Unproductive on dry soils.
Large, attractive fruit.	Berries average small the second year.
Good canner.	
A good late berry for the Maryland-Delaware section.	

Good Points	*Bad Points*

MARSHALL

Origin: Massachusetts.

Standard dessert quality.	Susceptible to leaf spot. Requires spraying, good care and liberal fertilizing.
Retails at a premium.	Not especially productive.

Grown in New England and on Pacific Coast.

MISSIONARY

Origin: Virginia.

Early.	Fruit soft in Middle Atlantic sections.
Free from leaf spot.	Only fair quality.
Good-sized and attractive.	

Grown especially in Florida.

CHESAPEAKE

Origin: Maryland.

Large, attractive fruit.	Few runners.
Free from leaf spot.	Light red flesh.
Does well under irrigation.	

PREMIER (*or Howard 17*)

Origin: Massachusetts.

Productive.	Only moderately firm.
Good for home canning.	Only good in quality.

New and promising in northeastern sections of the United States.

BELT (*William Belt*)

Origin: Ohio.

Productive.	Poor shipper.
High dessert quality.	Requires good care and fertile soil.
Attractive color.	

A well-known variety for home plantings.

GLEN MARY

Origin: Pennsylvania.

Productive.	Susceptible to leaf spot.
Attractive color.	Green or white tips.
	Slender fruiting stems.

Adapted to fertile, heavy soils.

Good Points	*Bad Points*

SAMPLE

Origin: Massachusetts.

Very productive.	Berries are soft.
High quality.	
Attractive color, form and size.	

Grown in home plantings and for local market.

BOUQUET

Origin: (Geneva) New York Agricultural Experiment Station.

Large, attractive fruit.	New and unknown.
Very productive.	

A comparatively new variety that looks promising.

JOE (*Big Joe*)

Origin: New Jersey.

Large berries.	Only moderately productive.
Handles well.	Not adapted to dry, cold conditions.
Good quality.	Berries color unevenly.

Does well under intensive culture. Grown to some extent in northeastern United States.

QUESTIONS

1. What characters make Dunlap the leading variety in many northern strawberry sections?
2. What are the requirements of a good variety for southern strawberry districts?
3. Contrast the strawberry variety requirements on market gardening soils near Boston with those of Florida.
4. Which of the following varieties of strawberries are especially good for preserving: Dunlap, Klondike, Premier, and Aroma?
5. Which of the following varieties of strawberries color evenly: Glen Mary, Premier, Joe, and Dunlap?
6. Name two varieties of strawberries that ship and handle well. Two varieties of strawberries that do not ship and handle well.
7. Why is the Belt (William) more popular in home plantings than in commercial plantings?

REFERENCE READINGS

CLEMENT, F. M., "Strawberry Culture and the Red Raspberry," Ontario Department of Agriculture, Bulletin 210, 1921.

DARROW, GEORGE M., "Strawberry Varieties in the United States," United States Department of Agriculture, Farmers' Bulletin 1043, 1919.

FLETCHER, S. W., "Strawberry Growing," Chapter XV, pp. 285–306, 1917.

CHAPTER XVI

CURRANTS AND GOOSEBERRIES

CURRANT VARIETY STUDY

One rarely sees a good collection of currant varieties. Currants have been widely planted in gardens, but usually only one or two varieties are found together. As our population becomes more dense, commercial production of this fruit should increase. Currant production is discouraged in New England because the currant is one of the hosts of white pine blister rust. It is unfortunate that many Systematic Pomology classes never study currant varieties from the fresh fruit. The fruit can be kept for class use and culinary purposes if stored at low temperatures (well below freezing).

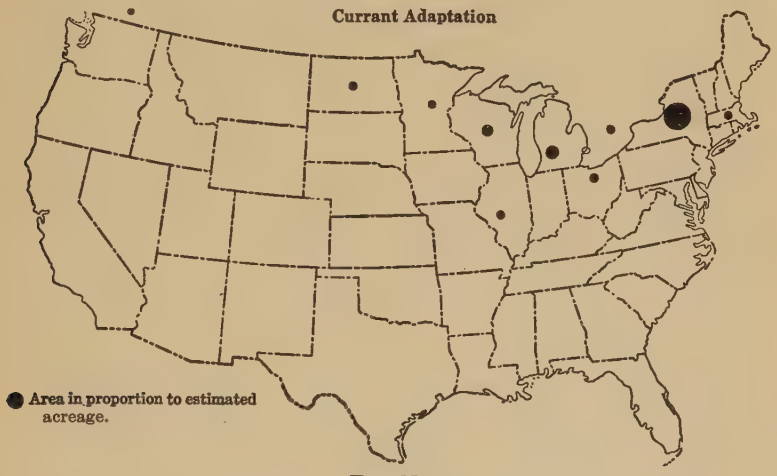


FIG. 83.

Cluster. — Length of cluster or bunch has long been considered important in identifying currant varieties. Most of our really popular varieties have a long cluster. Wilder, Perfection, White Grape, and Pomona have long clusters. Perhaps Perfection is the longest, sometimes containing as

many as twenty-two berries. The cluster of Red Cross is medium in length. Pomona has a rather loose cluster; this is the fault that was noted in the Winchell (Green Mountain) grape cluster. The student should examine the currant cluster to see if it has a peduncle and pedicel. Pickers prefer to gather Perfection rather than London Market, because the stem of the cluster is very short on London Market and very long on Perfection. Many varieties have nearly cylindrical clusters. The cluster of Pomona is tapering in shape.

Size of Berries. — Most markets prefer large currants like Perfection and Wilder. The former has a berry that is nearly one-half inch in diameter. The berries of White Grape and Pomona are quite variable in size, depending on the position in the bunch.

Color of Berries. — Color varies among currant varieties from some shade of white, through red to black. The yellow currant is an ornamental. Black currants are only occasionally grown in the United States, but are quite popular in Canada. The buying public thinks of currants as red. The color is usually a bright red, although it varies somewhat in depth. Perfection is usually a dark red, while Red Cross and Wilder are bright red. Pomona is a light red.

Flesh and Seeds. — The ideal currant flesh is "meaty," and not too acid. The flesh of Diploma and Wilder is called meaty. Perfection runs a little high in acid. Red Cross is a mild, high-flavored berry and should therefore become popular in home plantings. Most of our more popular varieties average from six to eight seeds per berry. Diploma is considered very seedy and may contain as many as eighteen seeds per berry. Perfection, averaging about eight seeds, is considered to have few seeds, for the berry is quite large.

Plant Characters. — Thayer[1] claims that currant varieties are best identified from foliage and plant characters. The foliage will vary from bronzy green to light green, especially in the early spring. Long Bunch Holland and London

[1] Thayer, Paul, "The Red and White Currants," Ohio Experiment Station, Bulletin 371.

Market have a light green foliage. Wilson Long Bunch has foliage with a coppery green color. Victoria and White Grape are noted for the thick pubescence on the under side of the leaves. Some varieties, like Wilder, have flat leaves; others, like Perfection, have leaves that are curved back or reflex. Growers do not like a very spreading bush. This is one of the objections to White Grape. Wilder forms an erect-growing bush. Perfection sends up but few shoots from beneath the ground.

FIG. 84. — On right, the flat leaves of Wilder red currant. On left, the reflex or recurved leaves of Perfection. Leaf characters of currants are very distinctive. This should be a great help in keeping varieties true to name in the nursery. The grower should be able to detect mis-named nursery stock by mid-season after planting.

NOTES ON A FEW CURRANT VARIETIES

Good Points	*Bad Points*
WILDER	
Origin: Indiana.	
Very productive.	Variable in size of fruit.
Hangs well after maturity.	Considered bud-tender in Canada.
Wide adaptation.	

Easily the most popular commercial variety of currants. This variety holds about the same place among currants that Concord holds among eastern-grown grapes.

Good Points	*Bad Points*

PERFECTION

Origin: Rochester, New York.

Very large berries.	Fruit scalds quickly.
Attractive fruit.	Sends up few canes.
Productive.	

Increasing in popularity where it does well.

FIG. 85.

Left: A cluster of Perfection currants.
Right: A small cluster of Wilder currants.

The berries of Perfection tend to be large, and uniform in size per cluster. The berries of Wilder are apt to be smaller than Perfection and variable in size.

DIPLOMA

Origin: New York.

Mild, rich flavor.	Very seedy.
Large, attractive fruit.	Short bunch.
	Comparatively new.

At least promising as a home variety, and for jelly making.

Good Points	*Bad Points*

Red Cross

Origin: By Jacob Moore of New York.

High quality.	Berries sometimes crack.
Large, attractive fruit.	Hardly as productive as some varieties.
Hangs well after maturity.	

A good variety for home plantings. Red Cross seems to be declining commercially.

London (*Market*)

Origin: Probably European.

Productive.	Hard to pick because of short stems.
Attractive fruit.	
Withstands hot, dry weather.	
Considered resistant to pine blister rust.	

A popular commercial variety in Michigan and adjacent sections.

White Grape

Origin: European probably.

Heavy producer.	Very spreading bush.
High quality.	A white currant. (This color is discounted on market.)

The White Grape is easily the most popular of the white currants. It is especially desirable in home plantings.

Champion

Origin: Unknown, probably European.

Productive.	A black currant. (This is against it in the United States.)
Good quality.	
Vigorous.	Fruit ripens unevenly.

One of the most popular of the black currants. Rarely grown commercially in United States.

Good Points	*Bad Points*
(*Black*) NAPLES	
Origin: European.	
Productive.	Fruit varies in size.
Vigorous grower.	Clusters small.

Judging from the number of plants sold by nurserymen in Canada, this variety is second to Champion in popularity among black currants. Its popularity is declining in Europe.

BOSKOOP GIANT	
Origin: European.	
High quality.	Comparatively new in this country.
Large bunch and berry.	
Productive.	
Vigorous.	

A popular variety in England. Considered promising in America.

GOOSEBERRY VARIETY STUDY

The fruits of the different varieties of gooseberries are much easier to distinguish from one another than the fruits of currant varieties. We can nearly always tell a European variety from an American by the size of the fruit alone. The variety Industry is about one and one-fourth inches in diameter, while Houghton (an American variety) is about half as large. Some people attribute the size of European gooseberries to years of selection with large size as the objective. This has been managed by offering prizes for large-sized fruits at fruit shows. The small size of varieties like Downing and Houghton is partly offset by heavy production. These often produce twice as much as the large-fruited European varieties.

Color and Shape. — When grown commercially, the gooseberry is harvested and marketed before it is fully ripe. The color is then some shade of green, or almost white. The ripe gooseberry, which is preferred by some people, varies from red to yellow in color. The variety Columbus is pale or yellowish green; Industry is a dark or claret red; Poorman is a bright red; and Downing is a reddish green. The shape varies from round to round-oval or round-oblong.

The word " round " is used here (as in most fruit studies) in the sense of " spherical." Industry is oblong-round; Downing and Houghton are round-oval; Crown Bob is nearly round.

Skin. — As a rule, gooseberries have a fairly tough skin. Perhaps it seems tough because the fruit is immature, for the skin is quite thin in many varieties. Downing and Houghton have thin skin; Chautauqua has a comparatively thick skin. Many of our best varieties have a smooth skin, although some are somewhat pubescent. Industry and Crown Bob do not have as smooth a skin as Downing and Houghton.

Flesh and Quality. — The variety Downing is considered soft-fleshed among gooseberries. Most varieties have comparatively firm flesh. Industry is mildly subacid in flavor, while Downing is considered sprightly sweetish. It is thought by many that the flavor of American gooseberries is, as a rule, superior to that of European varieties. This may be only a matter of opinion, or perhaps it is due to the fact that we are more accustomed to eating the American forms. Some varieties, like Columbus, have rather large seeds.

Plant Characters. — Of all the plant characters, susceptibility to mildew is the most important in judging European forms. Many European gooseberries have failed because of this one character. Industry, the leading European variety, is relatively free from this trouble, although it should receive more careful spraying than most American sorts. Houghton and Columbus form spreading bushes; Downing and Industry form upright-growing bushes.

NOTES ON GOOSEBERRY VARIETIES

Good Points	*Bad Points*
CHAUTAUQUA	
Large fruit.	Relatively hard to propagate.
Comparatively free from mildew.	Large seeds.
Productive for European variety.	

Grown to a limited extent only.

Good Points	*Bad Points*

DOWNING

Origin: New York, from seed of Houghton.

Well-known and adapted to wide range of conditions.	Less easily propagated than Houghton.
Very productive.	Rots easily when ripe.
Good in quality.	
Desirable for canning.	

The most widely grown variety of gooseberries.

HOUGHTON

Origin: Massachusetts.

Very productive.	Fruit small and not attractive.
Old variety and well-known.	Likely to mildew.
Adapted to wide range of conditions.	

An old variety that is widely grown.

INDUSTRY

Origin: European.

Best-known of any European variety.	Not very easy to propagate.
Large, attractive fruit.	Needs spraying to control mildew.
Comparatively free from mildew.	
Most productive of European varieties.	

A European variety that is often grown both in home plantings and commercially.

OREGON

Origin: Oregon.

Similar to Downing.	Similar to Downing.
Claimed to be especially adapted to Pacific Northwest.	

Grown in Northwest and seems well adapted to other sections.

POORMAN

Origin: Utah.

Large fruit for an American sort.	Comparatively unknown.
Productive.	

Claimed to be doing well in Utah and New York. A promising variety.

QUESTIONS

1. What characters tend to make Wilder the leading variety of red currants of North America?

2. What are the leading identification characters of the following varieties of currants: Perfection, London Market, Wilder, Victoria, and White Grape?

3. Which of the following varieties have dark red fruit: Red Cross, Perfection, London Market, Wilder, Diploma, and Pomona?

4. Name a variety of red currant that: (*a*) is very acid; (*b*) is quite mild in acidity; (*c*) has very large berries; (*d*) has very short-stemmed clusters.

5. What parts of North America are especially adapted to currant production?

6. How do European varieties of gooseberries differ from American?

7. What characters make Downing the most popular variety of gooseberry in North America?

8. What is the largest-fruited variety of American gooseberries?

9. Compare European to American varieties of gooseberries from the point of view of commercial production in North America.

REFERENCE READINGS

DANIELS, F. P., "Modern Bush Fruit Growing," Minnesota Agricultural Extension Division, Special Bulletin 79, 1923.

DARROW, GEORGE M., "Currants and Gooseberries," United States Department of Agriculture, Farmers' Bulletin 1024, 1919.

PALMER, E. F., "Currants and Gooseberries," Ontario Department of Agriculture, Bulletin 222, 1921.

THAYER, PAUL, "The Red and White Currants," Ohio Agricultural Experiment Station, Bulletin 371, 1923.

CHAPTER XVII

CRANBERRIES AND BLUEBERRIES

CRANBERRIES

Cranberries and blueberries are often called heather fruits, or, more correctly, the American heather fruits. These two native fruits are rapidly growing in popularity, and new and better varieties are being selected. Their commercial production is sharply localized. The great mass of the American people have never seen cranberries growing, although cranberry sauce is a standard Thanksgiving dish.

Cranberry Adaptation. — As shown on the accompanying map, Cape Cod, Massachusetts, and New Jersey are the

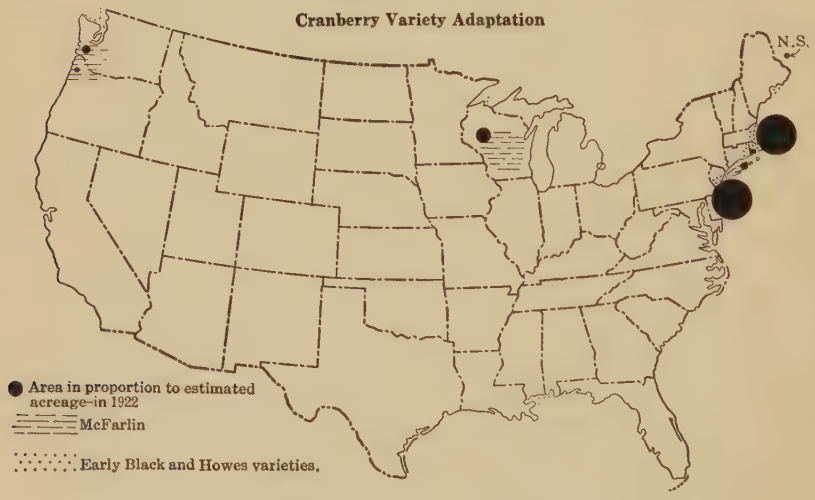


Fig. 86.

important producing centers for cranberries. Wisconsin, Nova Scotia, Washington, British Columbia, Quebec, and Prince Edward Island are small producing centers. Drained

swamp land, preferably with a muck and peat formation; an acid soil; water privileges for flooding, and a convenient supply of sand are part of the requirements of this crop. The cranberry, which includes a number of species, is adapted to dry uplands, as well as moist lowlands, but commercial production of the cultivated cranberry is limited to moist conditions. Variety adaptation is limited by length of growing season. The cranberry crop must grow and mature in a comparatively short time, from sixty to ninety days. New Jersey and Massachusetts grow somewhat longer-seasoned varieties than Wisconsin and some parts of Canada.

Size and Form of Cranberries. — When a number of varieties of cranberries are compared, the form of the berries is seen to be a very striking character. Perry Red is usually somewhat oblate and small; Mathews and McFarlin are large and oval; Pride is markedly pyriform and about medium in size. The market prefers a round or oval berry. The cross-section is often nearly square, although sometimes elliptical. Holliston illustrates the latter type of cross-section, and Wales Henry the former. Early plantings of cranberries were made with plants selected from the wild. A large part of the Wisconsin acreage still consists of wild forms, which are called " Bell and Cherry " from their shapes. Some of our newer varieties are very large. Holliston, Wales Henry, and Searl are good illustrations of very large-fruited varieties.

Color. — Wild cranberries vary from nearly white to red and black red. Our cultivated varieties are usually some shade of red. Early Black is usually nearly black, although the shade of color will vary somewhat with the time of picking. The red in cranberries, unlike that in apples, is said to increase in storage. Bennett and Centennial are usually a light red. Deep-colored specimens often show red in the flesh. Early Black is almost too dark to be ideal in color.

Firmness. — Most varieties of cranberries ship and handle well. They are a comparatively firm fruit, as is

illustrated by the bouncing method of sorting. Howes is usually firmer than Early Black or Centennial. Large berries will usually seem less firm than small berries.

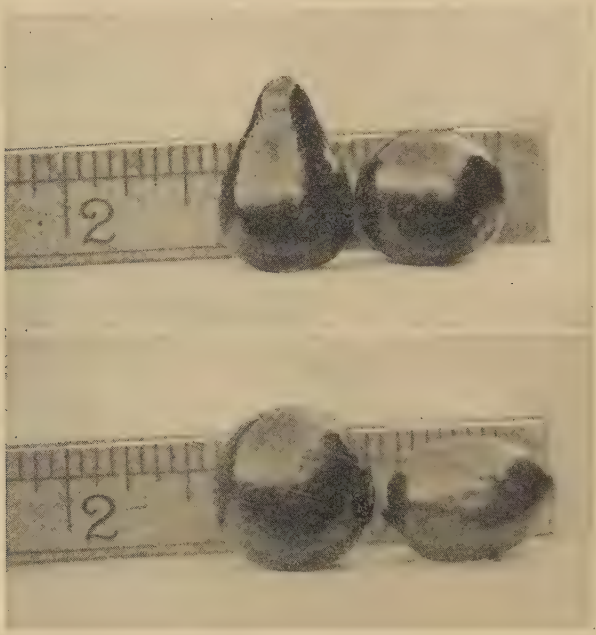


Fig. 87.

Upper left: Pride variety of cranberry, illustrating pyriform.
Upper right: Perry Red variety of cranberry, illustrating oblate form.
Lower left: Wales Henry variety of cranberry, illustrating round form.
Lower right: Howes variety of cranberry, illustrating oval form.

Internal Characters. — Small-fruited varieties have small seed cells; in those bearing large fruit, the seed cells also are large. Perry Red has a smaller seed cell than Mathews. There is also some variation in number and size of seeds, although this is not very marked.

Flavor and Quality. — Next to form, flavor and quality are the most striking characters among cranberry varieties. Early Black and Howes are quite acid; Wales Henry and Pride are mildly subacid. Howes sometimes has a slightly bitter flavor. Although Early Black and Howes are grown

more than other varieties, they are not of the highest quality. Quality in cranberries means culinary quality. Pride, Perry Red, and Mathews are at least good in this respect. Centennial is high in sugar and low in acid. McFarlin is considered very good in quality.

Keeping quality is of considerable commercial importance. Howes is perhaps the longest-keeping variety we have. Early Black is not a very good keeper, although its keeping quality may be influenced by the time of picking. McFarlin is a somewhat better keeper than Centennial.

NOTES ON CRANBERRY VARIETIES

Good Points	*Bad Points*
Bennett	
Origin: Wisconsin.	
Large, attractive fruit.	Susceptible to "false blossom."
Good keeper.	
Grown in Wisconsin as a late-ripening variety.	
Centennial	
Origin: Massachusetts.	
Very large.	Poor keeper.
Quite productive.	
Attractive fruit.	
High quality.	
Grown to some extent in New Jersey.	
Early Black	
Origin: Massachusetts.	
Early-ripening in Massachusetts.	Only good in quality.
Quite attractive.	Susceptible to fruit worm.
Productive.	
The leading variety in Massachusetts.	
Holliston	
Large, attractive fruit.	Comparatively new.
Good quality.	

Good Points	*Bad Points*

HOWES

Origin: Massachusetts.

Long keeper.	Only medium in quality.
Medium-sized, attractive fruit.	Not productive in Wisconsin.
Vines good for scooping.	
Productive.	

A prominent berry in Massachusetts and New Jersey.

MCFARLIN

Origin: Massachusetts.

Good quality.	Vines poor for scooping.
Attractive fruit.	Irregular sized.

The leading variety in Wisconsin and Washington.

MATHEWS

Large, attractive.	Relatively new.
High quality.	

Grown in Massachusetts.

SEARL

Origin: Wisconsin.

Large and good color.	Not very good keeper.
Productive.	

Grown and being planted in Wisconsin.

PRIDE

Good quality.	Pyriform berry.
Very productive.	Comparatively new.

An interesting variety, but not grown much commercially.

BLUEBERRIES

Blueberries are a popular kind of fruit in practically all sections where they grow wild. The sale of fruit from blueberry pastures is a source of income on many farms. This group of fruits, in one form and another, is adapted to a wide area, extending from the Gulf of Mexico well into Canada. The three common forms in New England are

the high-bush (*Vaccinium corymbosum*, Linn.), the low-bush (*Vaccinium Pennsylvanicum*, Lam.), and the half-high-bush (*Vaccinium Canadense*, Kahn). In some parts of the United States, huckleberries (genus *Gaylussacia*) are confused with blueberries. Huckleberries are more seedy and less popular than blueberries.

The commercial production of blueberries has been, for the most part, limited to blueberry " barrens," pastures, or wild growths. Some of the nicest berries are often gathered on burnt-over forest land several years after the fire. These blueberry fields usually consist of wild forms that happen to grow there. It is not uncommon to find blueberry fields

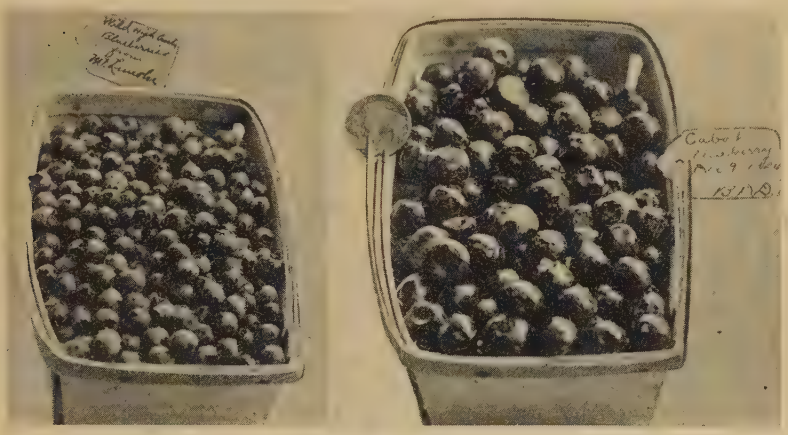


FIG. 88.

Left: Wild blueberries that are somewhat larger than the average. This fruit keeps especially well by the "cold pack" method.

Right: Some "cold pack" Cabot blueberries. These specimens were shipped over one hundred miles before storing. Note the bruising and absence of bloom. Pickers, occasionally, find wild plants bearing fruit nearly as large as these specimens.

of selected forms, which are sometimes nearly as large and as delicious as our best named varieties. The process of selecting or developing really superior varieties of an unimproved kind of fruit takes time. We have made a splendid beginning in selecting and developing superior varieties of blueberries, but it is only a beginning.

Blueberry Forms. — It is always interesting to compare the blueberries in any blueberry field. The addition of a few of our named varieties will add interest to this study. Blueberries resemble cranberries in many respects. Some writers refer to cranberries as red-fruited *Vaccinium*, and to blueberries as blue-to-black-fruited *Vaccinium*, although wild forms of blueberries vary from white to black in color of fruit. The forms of the fruit are similar to those found in cranberries. The variety Adams tends to be pyriform. Pioneer and Rubel tend to be oblate, and Cabot is more globose. Rubel is claimed to be over five-eighths of an inch in cross diameter, and Adams is somewhat less. The wild forms vary from this size to one-eighth of an inch in diameter or less.

Color. — The color of blueberries is very much modified by the bloom. Most forms or varieties of blueberries have a heavy bloom which gives the fruit a bluish appearance. Pioneer is light blue; Cabot is dark blue, with somewhat less bloom than Pioneer. The bloom rubs off in handling and shipping in some varieties.

Firmness. — The shipping quality of wild blueberries is limited by the softest kinds in a given box. Cultivated varieties are a more uniform product and usually reasonably firm.

Seediness. — Our large-fruited varieties of blueberries often seem less seedy than the small-fruited wild forms. This is usually due to the difference in the sizes of the berries, since both have about the same number of seeds. Pioneer has thirty or more seeds per berry, and Cabot about twelve on an average, with a number of the seeds abortive.

Flavor and Quality. — Blueberries vary from nearly sweet to quite tart in flavor. Cabot is subacid, while Pioneer has a milder flavor. The rich flavors of blueberries, both fresh and cooked, are distinctive of this kind of fruit. Some forms are spicy and others nearly flat.

Time of Ripening. — Time of ripening is an important character in all of our blueberry varieties. In some sec-

tions, growers prefer the early-ripening and the late-ripening varieties, because the wild blueberries compete with the cultivated ones during mid-season. Our earliest wild forms start to ripen in Massachusetts about July 4th. It is claimed that the variety Adams ripens very early. Katharine ripens somewhat earlier than Pioneer.

Selection of Varieties. — Katharine, Pioneer, and Cabot are found in commercial plantings of to-day. It is quite desirable to plant at least two varieties, to provide for cross-pollination. Most growers will find it advisable to test out, in a small way, at least some of the new varieties as fast as they are available.

QUESTIONS

1. Why do Early Black and Howes cranberries fail in Wisconsin? In the Pacific Northwest?
2. Name a variety of cranberries that tends to be pyriform.
3. Which of the following varieties of cranberries excel in culinary quality: Howes, McFarlin, Early Black and Mathews?
4. What are the cranberry vine requirements that make a good variety for scooping?
5. Name an early-ripening variety of blueberries.
6. Compare named varieties (such as Pioneer) with wild high-bush blueberries, as a commercial crop.

REFERENCE READINGS

Coville, Frederick V., "Directions for Blueberry Culture, 1921." United States Department of Agriculture, Bulletin 974.

Darrow, George M., Franklin, Henry J., and Maldé, O. G., "Establishing Cranberry Fields," United States Department of Agriculture, Farmers' Bulletin 1400, pp. 29–32, 1924.

Davis, M. B., "The Cranberry Industry, Its Possibilities in Canada," Dominion of Canada Department of Agriculture, Bulletin 29, p. 28, 1916.

Gourley, J. H., "The Blueberry in New Hampshire," New Hampshire Agriculture Experiment Station, Circular 18, 1917.

White, Joseph J., Inc., "Commercial Culture of Whitesbog Blueberries," 1924.

CHAPTER XVIII

CLASSIFICATION OF SMALL FRUITS

The growing of small fruits, both native and exotic, has long occupied a prominent place in American Horticulture. Some of these fruits, like the cranberry, are distinctly American. A story is told of a grower in the Cape Cod cranberry section who sent some cranberries to a friend in England, as a gift. The recipient expressed his appreciation, but noted that "the fruit must have soured on the way over." The small cranberry is a well-known European fruit.

Species Grouping of Small Fruits. — Our more important small fruit species are usually grouped as follows:

Vine fruits (Vitaceæ)

Grapes or Vitis fruits

Fox, or common American grapes
Vitis labrusca, Linn.
Old World, or wine grapes
Vitis vinifera, Linn.
Southern or Muscadine grapes
Vitis rotundifolia, Michx.
Vitis Munsoniana, Simpson
Summer grape — *Vitis æstivalis*, Michx.
Sand grape — *Vitis rupestris*, Scheele.
River-bank grape — *Vitis vulpina*, Linn.

Woody small fruits

Bramble fruits (Rosaceæ)

Red raspberry — *Rubus strigosus*, Michx.
Black raspberry — *Rubus occidentalis*, Linn.
Purple raspberry — *Rubus strigosus* × *R. occidentalis*.
Blackberry — *Rubus* sp. (Many species)

Loganberry — *Rubus vitifolius*, Cham. & Schlecht
Dewberry — *Rubus* sp. (Several species)

Ribaceous fruits (Saxifragaceæ)

Common currant — *Ribes vulgare*, Lam.
Black currant — *Ribes nigrum*, Linn.
American gooseberry — *Ribes hirtellum*, Michx.
European gooseberry — *Ribes Grossularia*, Linn.

Heather fruits (Ericaceæ)

Common cranberry — *Vaccinium macrocarpon*, Ait.
High-bush or cultivated blueberry — *Vaccinium corymbosum*, Linn.
Low-bush blueberry — *Vaccinium Pennsylvanicum*, Lam.
Canadian blueberry — *Vaccinium Canadense*, Kalm.
Common huckleberry — *Gaylussacia* sp.

Herbaceous fruits

The strawberry (Rosaceæ)

Cultivated strawberry — *Fragaria Chiloensis*, Duchesne.
Virginian strawberry — *Fragaria Virginiana*, Duchesne.
Alpine strawberry — *Fragaria vesca*, Linn.

Old World or Vinifera Grapes. — This species is the grape of ancient history. The group is widely grown throughout California, southern Europe and adjoining countries. It is distinguished by intermittent tendrils, a rather thick diaphragm at the nodes, and smooth young shoots. The clusters of fruit tend to be large; the berries are oblong, sometimes round, and the flesh clings to the skin. Most varieties require a rather long season for maturing, and are rather tender to severe cold. Mildew and black rot are serious diseases in humid sections. The soft, fleshy roots are badly attacked by phylloxera. European growers commonly grow vinifera grapes on riparia (*V. vulpina*), the

river-bank grape, to avoid injury from phylloxera. The fruit of this grape is used for wine making, for raisins, and as a table grape. The sugar content of the fruit of some varieties tends to run high. Most table grape varieties are good keepers and shippers. Some prefer the refreshing and foxy flavor of labrusca grapes, when in season, to those of the sweeter and more meaty vinifera varieties. Thousands of varieties of Old World grapes have been cultivated. A selected list of California-grown varieties alone would be rather long.

Variety Grouping of Old World Grapes. — Varieties of vinifera grapes are usually grouped according to color of fruit and use. This is purely an artificial classification. Thus, Ohanez is grouped with Sultanina (Thompson Seedless) because they are both white table grapes. A variety that is commonly used for more than one purpose occurs in more than one group. Muscat of Alexandria occurs under raisin grapes and white table grapes. Golden Chasselas is used both as a table grape and for wine. This grouping has utility to commend it. European workers have made other groupings of this fruit, which may come into more common use in the future.

The Common American or Labrusca Grape. — This is the cultivated grape of the northern and eastern United States and southern Canada. It is a native fruit. The more common distinguishing characters are pubescent young shoots, thick diaphragm, continuous tendrils, and musky or foxy flavored fruit. The flesh parts readily from the skin. This species hybridizes readily with others. Varieties of this group are noted for yielding a refreshing juice and for their suitability for table or fresh-fruit uses. Most labrusca grapes tend to crack in handling, and are not good keepers. Many varieties will mature in a short season.

Variety Grouping of Labrusca Grapes. — Commercial production of native grapes is of very recent development. We should hardly expect, therefore, to find careful classifica-

tions. Nursery catalogues commonly list varieties according to color of fruit and season of ripening. Labrusca varieties are often divided into pure labrusca and labrusca × vinifera groups. This latter grouping is a natural classification. Catawba, Niagara, Brighton, Barry, and Diamond are prominent varieties in the labrusca-vinifera hybrid group. Worden, Concord, Moore, Pocklington, and Cottage represent pure labrusca varieties. A third group would include labrusca hybrids crossed with species other than vinifera. Delaware and Clinton are representative varieties of this group.

Muscadine Grapes. — This group includes two species. Our more common cultivated varieties belong to *Vitis rotundifolia*. The latter species is distinguished by absence of diaphragm, intermittent tendrils (every third node bare), and a long woody vine. The fruit is very striking, with its small clusters. The berries tend to drop when ripe, and the skin is thick and tough. Some varieties are being selected for juice purposes. There is no commonly accepted grouping of varieties.

Raspberries. — The European species of red raspberry, *Rubus idæus*, has never gained a very secure foothold in North America, largely because of its lack of hardiness to cold. Antwerp and Superlative are varieties belonging to this species that are still grown on the Pacific Coast. The raspberry is distinguished from the blackberry and dewberry by the production of fruit that separates from its receptacle.

Classification of Raspberry Varieties. — Raspberry varieties fall into three natural groups, as follows: Red raspberries (*Rubus strigosus* and *Rubus idæus*) include yellow-fruited, upright-growing varieties, as well as red-fruited forms. The canes grow stiffly erect, and are inclined to produce suckers. This group includes varieties like Cuthbert, Herbert, Marlboro, and Red June. Varieties within the group are likely to require similar culture and to be attacked by the same diseases and insects.

Black raspberries (*Rubus occidentalis*) include yellow-fruited varieties with recurved canes, as well as black-fruited forms. The recurved canes distinguish this group. The fruit is usually firmer than that of red varieties. Kansas, Plum Farmer, and Gregg are the most prominent commercially.

Purple raspberries include varieties resulting from crosses between red and black raspberries. The characters are likely to be intermediate. Some forms have erect or partly recurved canes; others are usually recurved. Some claim that these hybrid plants are more vigorous than their red-fruited and black-fruited parents.

Blackberries and dewberries include a group of plants with fruit composed of many small drupelets that do not separate readily from the fleshy receptacle. Blackberries have more or less erect canes; dewberries tend to be procumbent. Most workers divide the group into many species, but differ as to their number and kinds. Any given plant will vary greatly under different environments. There are sun forms and shade forms of foliage; and even thorniness is likely to change with the amount of sunlight. Dry-land forms look very different from those growing in moist, humid locations. Intercrossing is very common among species and varieties. The blackberry and dewberry are native American fruits and our cultivated varieties are of recent origin.

Variety Classification of Blackberries and Dewberries. — Plant students do not agree on either the number or the kinds of species that exist among blackberries and dewberries. Brainerd and Peitersen[1] have recently suggested a grouping of varieties based on species. This would make a natural classification, but the grouping is not complete. An artificial grouping of blackberry varieties can be made on the basis of fruiting habits, such as the following: cluster buds

[1] Brainerd, Ezra, and Peitersen, A. K., "Blackberries of New England — Their Classification," Vermont Agricultural Experiment Station, Bulletin 217, 1920.

(blossom buds) near the base of branches or well down on the canes, as illustrated by Ward and Lawton; cluster buds near the tip of branches or well out on the canes, as in Taylor and Wachusett; cluster buds well distributed over the canes as in some of our more common varieties, like Eldorado, Snyder, and Ancient Briton. This grouping has utility to commend it.

Another common grouping of varieties is based largely on the type of fruiting cluster. The long-cluster group includes varieties with tall canes and thimble-shaped berries with many small, closely packed drupelets. The fruiting cluster is long and does not have leaves mixed with fruit. Iceberg, Taylor, and Ancient Briton are prominent varieties of this group. The short-cluster group tends to have smaller plants and short, leafless clusters of fruit. Snyder, Lawton, and Agawam illustrate this group. The leafy-cluster blackberries tend to form low-growing plants, with short clusters of fruit mixed with leaves. Early Harvest and Dorchester represent this group. The varieties belonging to the loose-cluster group are probably hybrids between blackberries and dewberries. The berries are large and roundish, with large drupelets. Early Wilson and Wilson Junior illustrate this group. The Evergreen blackberries are probably of European origin. The foliage is nearly evergreen; the plant is vine-like in habits of growth; and the fruit ripens during a period of considerable length. The Oregon Evergreen is a typical variety.

Classification of Dewberries. — Pacific Coast dewberries include the Loganberry variety and others derived from *Rubus vitifolius*. The fruit tends to be round or oblong and the canes procumbent with staminate and pistillate flowers on different plants. The Loganberry is the most important variety.

Common cultivated dewberries are usually divided into several species. The fruiting cluster is very loose, with the terminal blossom opening first (compare with the blackberry). The berries are large, with large drupelets, and

tend to ripen earlier than blackberries. The plants withstand heat better than blackberries. Lucretia, Mayes, and Premo are representative varieties of this group.

Currants. — The currant is a well-known garden fruit of the north temperate zone. It differs from the gooseberry in having fruit in clusters or racemes, and pedicels that are not jointed. The plants are usually unarmed, or nearly so. Some forms of the currant are often used for ornamental purposes. The cultivated varieties have been derived from four species, the majority of them from *Ribes vulgare*. The variety Long Bunch Holland shows many of the characters of *Ribes petræum*. Black-fruited varieties belong to *Ribes nigrum*.

Classification of Currant Varieties. — The following natural classification of red and white currant varieties is based almost entirely on plant characters:

Macrocarpum or Cherry Currants. — This group includes a large number of varieties having thick, coarsely veined leaves that drop in late summer or early fall. The blossoms are uncolored, except for a central disk, which is sometimes red. Cherry, Fay, Perfection, Chautauqua, and White Versailles are representatives of the group of cherry currants.

Garden Currants and Hybrids. — This group has thinner and more delicate foliage than varieties of the preceding group. The leaves are either folded or flat. Wilder, White Grape, Red Cross, Diploma, and Pomona are prominent varieties of this group.

Northern Red Currant and Hybrids. — Northern red currant forms have pubescent foliage that tends to hang late in the fall. The blossoms have sepals blotched with red. London Market and Victoria are representative varieties.

Ribes petræum and Hybrids. — This class includes varieties having dark foliage that hangs until winter. The shoots are very stiff, with new shoots reddish in early summer. The fruit ripens late. The blossoms are bell-shaped with sepals splashed with red. Long Bunch Holland and

Prince Albert are the most important commercial varieties.

Black currants are cultivated to a considerable extent in Canada, and to a less extent in the United States. Susceptibility to white pine blister rust limits their production in some sections. Boskoop Giant and Victoria are representative varieties.

Gooseberries include a group of plants cultivated both for ornamental purposes and for fruit. The more common commercial varieties fall readily into the two natural groups, native and European. The native American gooseberry group includes hybrids with European varieties, as well as varieties derived from native forms. Most of our gooseberries have been developed from the smooth gooseberry, *Ribes hirtellum*. Our native varieties tend to be free from mildew and hardy to cold. They produce heavily as compared with European forms. Downing, Houghton, Pearl, Josselyn, Poorman, and Oregon are prominent native varieties. European gooseberries are derived from *Ribes Grossularia*, the wild gooseberry of Europe. While the wild forms produce fruit no larger than our native gooseberries, the cultivated European varieties are noted for large fruit. Industry, Columbus, and May Duke are the more important commercial varieties.

The cranberry is often spoken of as the red-fruited *Vaccinium*. The fruit is attached to a long pedicel. The cultivated species (*V. macrocarpon*) tend to produce creeping shoots with upright flower branches. The mountain cranberry and the small cranberry are two other species commonly found growing wild in eastern North America. Wild forms of our large American cranberry (*V. macrocarpon*) could easily be classified as to shape of fruit. Cultivated wild forms, differing as to shape of fruit, are often spoken of as "Bell" and "Cherry." There is no commonly recognized grouping of cultivated varieties.

The blueberry is represented in many sections of eastern North America by at least three species. Fruit of *Vaccinium*

Pennsylvanicum, Lam., the low-bush blueberry, is widely gathered as it grows wild. It is a low-growing plant, often only eight inches high. The foliage falls early in the autumn.

The Canadian blueberry, *V. Canadense*, grows somewhat higher than the low-bush blueberry. The fruit also is more acid and ripens later. Most of our cultivated varieties of blueberries belong to the high-bush blueberry, *Vaccinium corymbosum*. Large, attractive bushes, high quality, and large fruit recommend this species to the fruit grower. The high-bush blueberry is valued for ornamental planting, as well as for fruit. Classification is limited at the present time to species.

The common huckleberry is often confused with the blueberry throughout a large part of eastern North America. This tends to bring the blueberry into disrepute, for the huckleberry fruit is poorer in quality and contains about ten very hard seeds (called nutlets). The seeds of the blueberry are numerous but very small. Huckleberries are easily distinguished from blueberries by these hard nutlets, each of which is located in a separate cell.

The strawberry represents a group of fruits adapted to a wide range of conditions. Early settlers in eastern North America cultivated the native wild strawberry, *Fragaria Virginiana*. The Virginian strawberry is noted for slender foliage and small, rather soft fruit. Most varieties of this species have been discarded, although it is one of the ancestors of some of our cultivated varieties.

Our common cultivated strawberries were largely derived from *Fragaria Chiloensis*, the Chilean strawberry. This species is a native of our west coast and of the west coast of South America. It is noted for its good foliage and fruit characters, although the fruit is sometimes inferior in flavor to that of other native species. The large, firm, dark-colored berries have helped to establish *F. Chiloensis* in Europe as well as in America. There is no commonly recognized grouping of strawberry varieties.

QUESTIONS

1. How would you distinguish between a vine of *Vitis labrusca* and one of *Vitis vinifera?*

2. Compare the fruit characters of labrusca with those of vinifera.

3. Compare the three natural groups of raspberries as commercial fruits for your section.

4. Why have wild, low-bush blueberries become more important commercially than wild, high-bush blueberries?

5. Compare the fruit of *Fragaria Chiloensis* with that of *Fragaria Virginiana.*

6. How can you distinguish between dewberries and blackberries?

REFERENCE READINGS

Bailey, L. H., "The Standard Cyclopedia of Horticulture," 1915.
Card, Fred W., "Bush Fruits," 1917.
Fletcher, S. W., "Strawberry Growing," 1917.
Hedrick, U. P., "The Grapes of New York," 1907.
Young, W. J., "Muscadine Grapes: Culture and Varieties," South Carolina Agricultural Experiment Station, Bulletin 205, 1920.

CHAPTER XIX

SOUTHERN FRUITS

One of the most striking developments in the fruit industry in recent years is the rapid increase in the supply of tropical and subtropical fruits on our northern markets. Grapefruit, our well-known breakfast fruit, was unknown on northern markets before 1880. According to tradition, the Philadelphia market received its first barrel of grapefruit

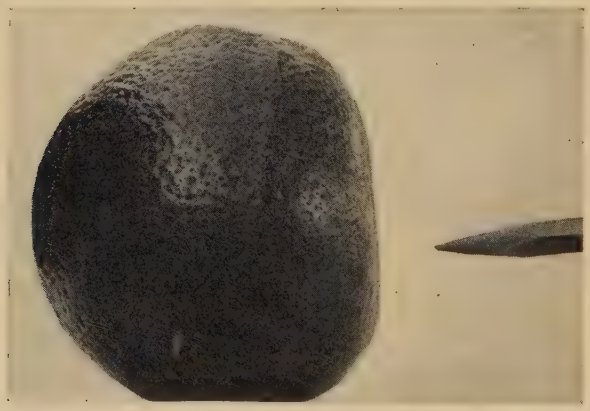


Fig. 89. — The shipping quality of citrus fruits ranks high. The rind of the better varieties is pliable and will bend without cracking. The flesh is frequently flattened by one specimen pressing against another. This flattening, unless too severe, does not result in serious injury to the juice sacks of the flesh.

about 1880 and the fruit sold for 50 cents per barrel. The Florida section alone shipped over 18,000 cars of grapefruit in 1923. The possible future increase in the shipments of southern-grown fruit to our northern markets is an interesting subject for speculation. There will undoubtedly be a steady increase, but we do not expect it to be as rapid as that which took place with grapefruit during the past

forty years. It is well for our northern fruit growers to take a competitor's interest in southern-grown fruits. High-priced apples and low-priced oranges will usually result in increased use of the cheaper fruit in the menu.

CLASSIFICATION OF SOUTHERN-GROWN FRUITS

Citrus fruits

Common or sweet orange — *Citrus sinensis*, Osbeck.
Sour orange (used for stock) — *Citrus aurantium*, Linn.
Trifoliate orange (used for stock) — *Poncerius trifoliata*, Raf.
Kid Glove orange (King) — *Citrus nobilis*, Lour.
(Satsuma) — *Citrus nobilis*, var. *Unshin*, Swingle
(Mandarin) — *Citrus nobilis* var. *deliciosa*, Swingle
Grapefruit or pomelo — *Citrus grandis*, Osbeck
Common lemon — *Citrus limonia*, Osbeck
Lime — *Citrus aurantifolia*, Swingle
Kumquat — *Fortunella* sp.
Citron — *Citrus medica*, Linn.

Subtropic fruits

Avocado or alligator pear — *Persea gratissima*, Gaertn.
Banana — *Musa sapientum*, Linn.
Date — *Phœnix dactylifera*, Linn.
Fig — *Ficus carica*, Linn.
Olive — *Olea europœa*, Linn.
Pineapple — *Ananas sativus*, Schult.

ORANGE

The orange is the most important citrus fruit and occupies a place similar to that of the apple among deciduous or northern fruits. The consuming public buys three kinds of oranges: navel, California (Valencia), and Florida oranges. This is partly due to the variations that often exist within a variety. The orange and other citrus fruits are generally noted for bud sports. Thus, Shamel claimed to have found

thirteen strains of the Washington Navel orange. More careful methods of selecting bud wood have helped to standardize varieties and strains.

Size and Form. — Very good specimens of several orange varieties can usually be selected at the fruit stand, although

FIG. 90. — Juice sacks of citrus fruits.

Upper: Satsuma type of tangerine juice sack.

Second: McCarty variety of grapefruit. McCarty juice sacks represent about medium size for this kind of fruit.

Third: Valencia orange juice sacks. Note the slender, pointed spindle form. Juice sacks have a decided influence on the texture of flesh.

Lower: Juice sacks of Duncan grapefruit.

the number and kind secured may vary with the season of the year. Most oranges tend to be round (spherical) in form, and are usually quite symmetrical. A medium-sized orange is a little over three inches in diameter. It is customary to indicate the size of oranges by stating the number of specimens required to fill a box. Ninety-sixes are very large, too large to suit most markets; 225's are small and usually sell at a discount. Most markets prefer grapefruit

that will pack from fifty-four to seventy per box. These terms may be translated into diameter in inches per specimen. Ruby, an early-ripening Florida variety, tends to run a little below the average size. Tangerines and fruits of that class are usually oblate in form, and somewhat smaller than oranges. King is a large variety of this group. Specimens of the Bahia (Washington Navel) variety of oranges are sometimes misshapen, because of the large size of the navel. The better strains have a very small navel. Many seed orange varieties show a navel marking.

Surface. — King oranges and many tangerines have a very rough or uneven surface. Neither tangerines nor kumquats have as smooth a surface as grapefruit. Pineapple oranges usually have a smoother surface than Bahia (Washington Navel). The color of oranges has a decided effect on the selling price. This is one reason for the popularity of the Bahia variety, which is of a reddish orange color. Varieties like Parson (Brown) and Pineapple are often light yellow. The rind of oranges and other citrus fruits contains numerous oil cells. Many of these oil cells show on the surface and may be concave, convex, or smooth. Valencia oil cells are usually convex. King oil cells are quite large. Foster grapefruit usually has either smooth or concave oil cells.

Peel. — The ideal peel for citrus fruits is one that is thin, elastic, and well-flavored, and that separates readily from the flesh. King orange has a brittle, thick, but well-flavored peel. The peel of navel oranges separates readily, but is thicker and more brittle than the rind of Valencia. Tangerine peel is noted for the ease with which it separates from the flesh. Specimens of citrus fruits, especially grapefruit, are far less rigid than apples and pears, as their elastic skin permits bending without cracking. A minimum of " rag," which is the fibrous tissue on the inside of the fruit, is desirable in a citrus fruit.

Segments. — An orange or grapefruit can be readily separated into segments or sections. Each section is

surrounded with a tissue called an envelope. Irregularly shaped segments and thick, tough envelopes are undesirable. Most varieties are inclined to have twelve sections, although Bahia may have as few as nine sections. Some of the less desirable strains of oranges have large cores. The core may be hollow or solid. Parson and Pineapple have cores

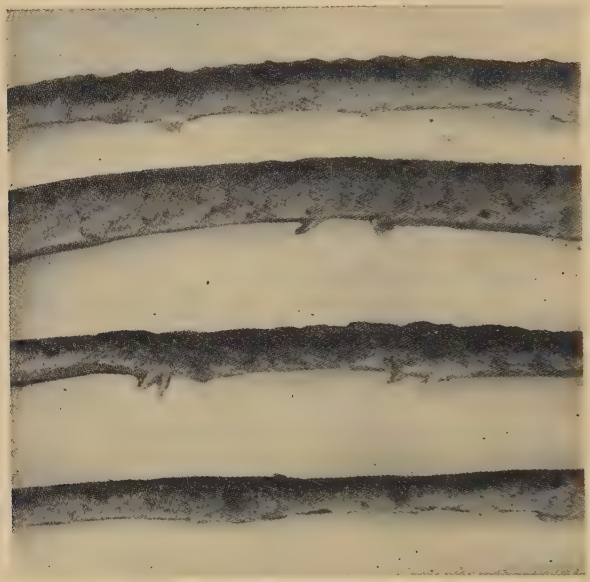


Fig. 91. — A study in rinds of citrus fruits.

Top to bottom: Valencia orange. Notice the convex, large, round oil cells. Bahia (Washington Navel) orange. This variety has a rather thick rind with few globose oil cells. King kid-glove orange. King has a thick rind for a tangerine-like orange. Notice the numerous large balloon shaped oil cells. Pineapple orange. The rind is relatively thin with few and usually small oil cells.

measuring about one-half inch across. For commercial production, we desire small-cored strains and varieties.

Flesh. — The flesh of citrus fruits varies from nearly white through yellow to red. Foster is a pink-fleshed grapefruit. Most orange varieties have a yellowish flesh. The flesh of King is reddish. Each envelope contains many juice cells or juice sacks. Oranges usually have long

spindle-shaped juice cells; those of grapefruit are broader; and those of Satsuma tangerines are blunt or oval. Small juice cells tend to make fine-grained flesh. The flesh of Ruby will illustrate the meaning of the term "melting," which is commonly used to describe orange flesh.

Flavor and Juice. — A large amount of juice is quite desirable in an orange. Some varieties tend to lack juice toward the stem end; this is a failing of some strains of the Bahia (Washington Navel) variety. King and Dancy tangerines have colored juices. The juice of Pineapple is yellowish in color. A specimen of citrus fruit usually represents some combination of sweet, bitter (or astringent), and acid flavor. The flavor desired in oranges is known as "bouquet," and is a pleasing blend in which sweetness predominates. In the opinion of the author, most fancy specimens of Bahia should be graded as possessing a full bouquet. Commercially, the flavor is graded (at least in part) according to the ratio of acid to soluble solids, including sugar. Half bouquet and three-fourths bouquet represent other less desirable blends. The terms "vinous" and "sprightly" are also used to describe orange flavors. They usually mean a good blend.

Seeds. — Seediness is an important commercial character. The author's students often engage in discussions as to which is the more objectionable, a few seeds, or a navel formation. The leading variety of California is Bahia (Washington Navel), a seedless orange. Valencia and the better varieties of seed oranges have few seeds. Satsuma varies from seedless forms to those containing four seeds; Parson (Brown) has about twelve seeds; and Pineapple, from twelve to twenty or more seeds. Grapefruit varieties also vary in this respect. Marsh has large fruits that contain from none to six seeds. Triumph, a small-fruited, early-ripening variety, often has about thirty-seven seeds per fruit. Form, size, and color are other seed characters of some importance. It is not uncommon to find abortive seeds.

FIG. 92. — Navel vs. seeds. The public seem to prefer the navel, although some of our better varieties have few seeds. Perhaps navel oranges are more desirable in other ways. Present day bud selection is toward a small navel. Bahia (Washington Navel) orange on your left. Pineapple orange on the right.

Season of Ripening. — Cold storage for citrus fruits is a comparatively temporary problem as compared with the storage of winter varieties of apples. Florida oranges may be harvested from the trees from about Thanksgiving to the following September. Bahia (Washington Navel) oranges ripen in winter in California, and California Valencias are harvested in summer. The time of ripening of a given variety of grapefruit can be delayed as much as several weeks by proper applications of fertilizer. Most growers make a number of pickings for most varieties.

A FEW NOTES ON CITRUS FRUIT VARIETIES

Sweet Orange

Good Points	*Bad Points*
BAHIA (*Washington Navel*)	
Origin: Introduced from Brazil by the United States Department of Agriculture.	
Absence of seeds.	Poor producer in Florida.
Attractive color.	Flesh only moderately tender.
Navel "trademark."	Strains vary, as in most varieties of citrus fruits.
Good shipper.	
Good in quality.	

The most remarkable variety of oranges grown, and the one to which California's supremacy in orange production is largely due. More than half the oranges grown in California are of this variety. Bahia will undoubtedly represent a large part of the future plantings in California, but should not be planted commercially in Florida. Seedless varieties of citrus fruits can be planted in solid blocks.

Courtesy University of Arizona.

FIG. 93. — Bahia (Washington Navel) orange.

This variety ripens during late winter in California. Note the thick rind and large oil cells compared with Valencia. These two varieties are leaders in California.

PARSON (*Brown*)

Origin: Florida.

Early-ripening.
Good producer.
Attractive, although light in color.
Good shipper.
Loses flavor if left on tree after it matures.
Rather coarse flesh.
Medium number of seeds (about twelve or more).

Planted in Florida as an early-ripening variety.

PINEAPPLE

Origin: Florida.

High quality.
Good shipper.
Good producer.
Quite a few seeds.
Variable in color.

A well-known variety in Florida, where it ripens in January.

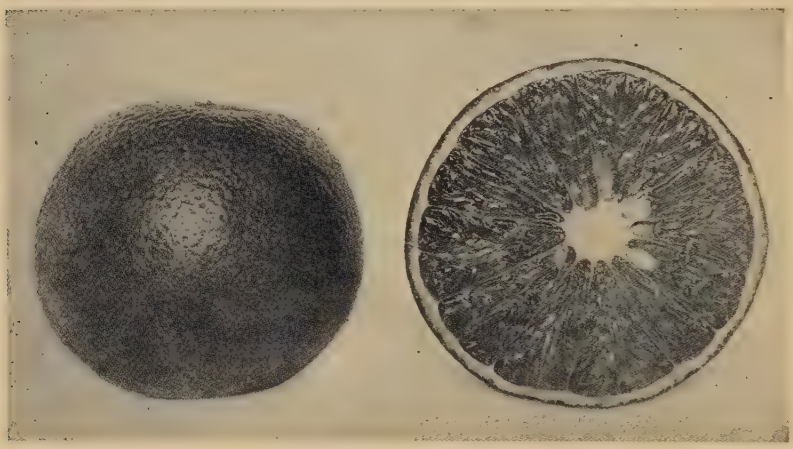
Good Points	*Bad Points*

RUBY

Origin: Uncertain, probably Europe.

High quality.	Seeds (about ten or more).
Attractive color.	Only medium-sized.
Mild acidity.	
Good and regular producer.	

A high quality variety of seed oranges. This variety is being planted to some extent both in California and in Florida. Ripens about March or earlier in Florida, and March to April in California.



Courtesy University of Arizona.

FIG. 94. — Valencia orange. This variety ripens late (during spring and early summer).

VALENCIA (*Hart*)

Origin: Spain.

Late season of ripening.	Fruit makes variety tender to frost during winter.
Good shipper.	
High quality.	Fruit apt to turn green if left too long on the tree in some sections.
Few seeds.	
Firm flesh.	

The leading variety of late oranges. This orange represents about one-third of the California crop. Ripens in early summer in Florida, and late summer in California. The Lue variety grown in Florida at least resembles Valencia.

Mandarin, Tangerine or Kid Glove Orange Varieties

Dancy

Origin: Florida.

High quality.
Excellent color.
Good producer.
Rather numerous seeds (seven to twenty).

Considered one of the best varieties of this group. Ripens December to February.

King (*Orange*)

Origin: China.

Late-ripening for a variety of this group.
High quality.
Very heavy producer (too heavy, needs thinning).
Large fruit for a tangerine.
Not very attractive.
Brittle wood.
Thorny tree.
Fruit often sun-scalds.

This variety has been extensively planted in Florida. It is a leading variety for home plantings. King Orange mandarins usually sell at good prices.

Satsuma (*several varieties*)

Origin: Japan.

Very hardy when budded on trifoliata stock.
High quality.
Ripens early.
Thornless tree.
Good producer.
Generally seedless.
Deteriorates soon after reaching maturity.
Late coloring in southern Florida.
Susceptible to citrus scab.

Owari and Ikeda are the leading varieties. Satsuma varieties are planted in the warmer parts of the Gulf States, and are claimed to have withstood temperatures as low as 15 degrees Fahrenheit without serious injury. Owari has an oblate fruit that ripens from October to November. Ikeda is more spherical and ripens several weeks later than Owari.

FIG. 95.

Upper: An Owari (Satsuma) orange tree loaded with fruit. Satsuma varieties of the "kid glove" orange group are more hardy to cold than varieties of the sweet orange group. *Courtesy S. W. Greene.*

Lower: A Bahia (Washington Navel) orange grove. Compare the tree characters with those of the Owari orange above. This variety is unsatisfactory in Florida, but represents a large part of the total production of California. *Courtesy University of Arizona.*

FIG. 96. — Two specimens of the Satsuma type of tangerine. These specimens cost more per specimen on a northern market than the navel orange on your left.

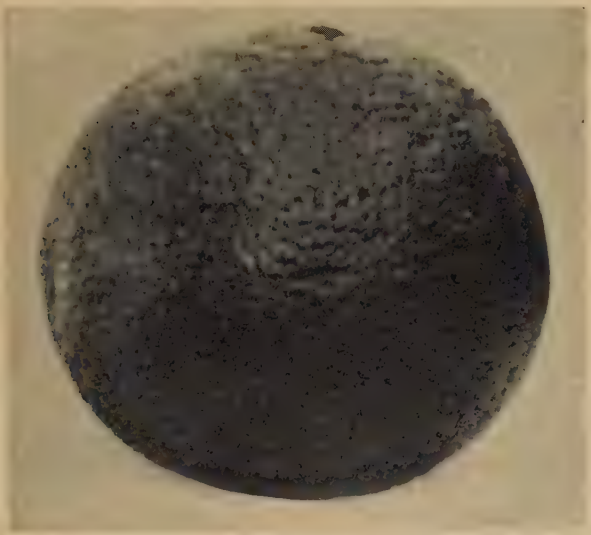


FIG. 97. — A specimen of the King variety of kid glove oranges as purchased on a northern market. This splendid variety of tangerine-like fruit is not very attractive in appearance, and looks like an orange.

GRAPEFRUIT (POMELO)

The grapefruit was introduced into Florida by the Spaniards, and grew wild there for many years. The fruit of these wild trees and unnamed budded trees are referred to in the market as "Florida Common." Nearly all of the later plantings are of named varieties. Florida's commercial grapefruit crop increased over 300 per cent from 1915 to 1923, and is now nearly forty times as large as that produced by California. Was the grapefruit adapted to Florida when first introduced by the Spaniards, or did it pass through a period of acclimatization? Certainly, our present-day varieties are well adapted to Florida and only moderately adapted to Californian conditions. Only occasionally is an imported variety found to be ideally adapted to a new country. Perhaps the Satsuma orange group will have to pass through a period of selection of the better acclimated varieties.

Notes on a Few Grapefruit Varieties

Good Points	*Bad Points*
Duncan	
Origin: Florida.	
Hardy to cold.	Seeds (five or more).
Good size and attractive.	
High quality.	
Good shipper.	

One of the most extensively grown varieties in Florida, and one of the oldest varieties. Marketed in late winter (Florida).

Foster	
Origin: Florida.	
Large, attractive fruit.	Some do not like the flavor, although others class it as good.
Ripens early.	
Pink flesh.	

A new (comparatively) variety that is attracting some attention. The author has seen only a few boxes of this variety in northern markets.

Good Points	*Bad Points*
MARSH (*Seedless*)	
Origin: Florida.	
Seedless, or nearly so.	Mild flavor (less bitter).
Large, attractive fruit.	
Quite productive.	
Late-ripening.	

Considered the best variety for California, where it ripens from January to July. A prominent variety in Florida.

LEMON

Commercial production of lemons is confined to California fully as much as that of grapefruit is to Florida. North America does not produce as many lemons as it

FIG. 98. — Three species and three varieties of Kumquats. The long shaped variety on your right is Nagami (Fortunella margarita). The center specimen is Neiwa (Fortunella crassifolia). The round specimen on your left is Marumi (Fortunella japonica).
Kumquats are becoming fairly common on northern markets.

consumes. From 15 to 30 per cent of the lemon supply of the United States is imported. Florida has steadily declined in lemon production since the freeze in 1894. The lemon is very tender to cold and is likely to show injury at temperatures below 28 degrees Fahrenheit. Many Florida lemon plantings have been budded to grapefruit in recent years. Some lemon growers claim that Florida-grown lemons tend to grow too large.

Notes on a Few Lemon Varieties

Good Points	*Bad Points*

Eureka

Origin: California.

Bears fruit throughout the year.	Undesirable strains.
Firm, solid flesh and thin rind.	Tender to cold, owing to open habits of growth.
Attractive, light straw color.	
"Button" raised.	
Juice high in acid.	

A prominent variety in California and a leading variety in newer plantings.

Lisbon

Origin: Portugal.

High quality (high in acid).	Matures entire crop in winter.
Good keeper.	
Uniform, attractive fruit.	
Vigorous grower with heavy foliage.	

Eureka and Lisbon are the two leading varieties in California.

Ponderosa

Very large fruit.	Not a commercial variety.
Mildly acid for a lemon.	
Rind good for culinary purposes.	

An interesting novelty and variety for home fruit plantings. Sometimes planted for pot culture.

Villafranca

High-quality fruit.	Comes into bearing rather slowly.
Tree nearly free from thorns.	Numerous seeds.
Regular bearer.	

This is the leading variety in Florida.

AVOCADO

The avocado, or "alligator pear," is a native of the warmer part of this continent. It has attracted considerable attention in northern markets because of its desirability as a salad fruit and, at least partly, because of its popular

although misleading name, "alligator pear." Our cultivated varieties include two species, *Persea Americana*, Mill., and *Persea crymifolia*, Cham. and Schlect. The latter includes small-fruited Mexican varieties, and has a pronounced anise odor in both leaves and immature fruit. The former (*Persea Americana*) includes two groups of varieties, namely, West Indian and Guatemalan. Trapp, the leading variety in Florida, belongs to the West Indian group. Fuerte, the leading variety in California, is a hybrid between Mexican and Guatemalan groups.

Comparison of Varieties. — Many varieties are pyriform, although some are round or oval. Puebla is somewhat flattened. Our better market varieties weigh from half a

Courtesy Knowles Ryerson.

FIG. 99. — Fuerte avocado — the leading variety in California. This variety is noted for hardiness to cold.

pound to about a pound. Large-fruited varieties run over a pound. The skin varies in color, smoothness, and thickness. Dickinson has a rough, thick, purple skin. The skin of Fuerte is greenish, thin, and leatherlike, with yellowish dots. The flesh varies in color and texture. Dickinson has a greenish-yellow flesh. The flesh of Fuerte is yellow

in color, buttery in texture, and high in oil. Puebla has a nutty flavor. Bitterness and fiber are objectionable characters of flesh. For commercial production, we prefer a small seed that is tight in the cavity. The seed of Puebla is medium in size, or larger.

Tree Characters. — Brittle wood and tenderness to cold are to be avoided among avocado varieties. Fuerte and Puebla are noted for hardiness to cold. Dickinson has rather brittle wood. The period required to mature fruit varies from nine to eighteen months.

FIG

The fig, dried, canned, and to a less extent in a fresh state, is a common article in our markets. The Mediterranean region produces the bulk of this crop. Southern California is a comparatively new producing section and one that is growing in importance. The fruit of the fig is a hollow receptacle lined on the inside with pistillate flowers. The part that is eaten is this fleshy receptacle and the pulpy mass that develops around the flowers during growth. The high quality of Smyrna figs as compared with that of common figs is usually attributed to the oily kernels of the seeds in the former. Smyrna fig seed will produce both common and Smyrna figs.

Classification of Fig Varieties. — The following classification of fig varieties is based on the kind of flowers, the type of fruit produced, and the need of caprification:

Smyrna figs include varieties having flowers with long, slender styles. The fruit will not mature without pollen. Pollen is secured from caprifig varieties, and is carried by the so-called " fig-wasp." Calimyrna is the leading variety in the California section. Other varieties are Lob Injir, Bardajic, Kassaba, and Rixford.

Caprifigs are the wild figs of southwestern Asia and southeastern Europe. The varieties that compose this group have male flowers and short styles. The fig-wasp larvæ live in the fruit of caprifigs. Most of the varieties produce

inedible or nearly inedible fruit. Roeding (No. 3), Stanford, and Milco are prominent varieties.

Common figs include varieties with long, slender styles. The fruit is produced without pollen, and contains seeds that are not viable. Occasional specimens may be pollenized and will produce viable seeds. Mission and Adriatic are prominent among the numerous varieties in this group.

San Pedro Figs. — The fig usually produces three crops: profichi, or the spring crop; mammoni, or the summer crop; and mamme, which mature in winter. The San Pedro fig varieties have flowers like those of common figs in the spring crop, while the summer crop contains flowers like those of Smyrna varieties. White San Pedro and Gentile are prominent varieties.

OLIVE

The olive is the popular relish fruit of our markets. Ripe or green pickled olives and olive oil are standard articles

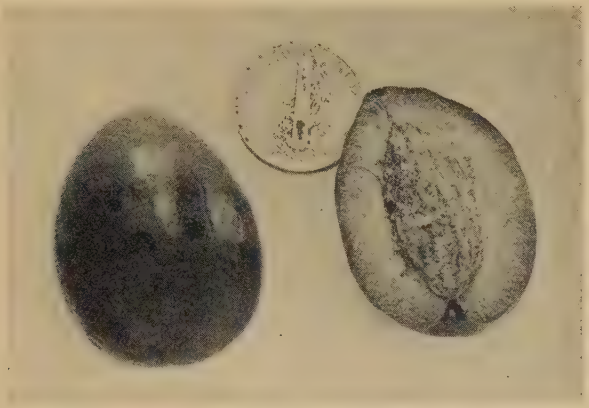


FIG. 100. — "Queen olives" (variety Sevillano). The demand for pickle olives places a premium on large fruited varieties. Sevillano is one of our largest fruited varieties.

in most American homes. This well-known ancient fruit thrives under the dry, hot conditions found in certain parts of Arizona and California. A large part of the ripe, pickled

olives found on our markets belong to the Mission variety. Mission olives represent about half the production of California and are the leading variety in Arizona. The pimento olives are usually prepared from the Manzanillo variety.

Variety Characteristics. — The fruit characters of olive varieties somewhat resemble those of plums. Ascolano is one of the largest-fruited varieties, and very light in color. Mission is noted for its color and firmness of flesh, which make it a very easy variety to pickle. Ascolano requires special care in pickling in order to darken the color. Manzanillo tends to have a tender flesh and contains less oil than Mission. Sevillano is a large-fruited variety grown for the largest sizes of green and ripe pickles. Mission is noted for hardiness to cold.

PINEAPPLE

The pineapple is a very popular fruit in American markets. Large quantities of canned pineapples are imported to the United States from Hawaii. Florida grows some, but much of our fresh fruit supply comes from Porto Rico and the West Indies. This plant is a native of tropical South America. The pineapple is a compound fruit, composed of many parts called eyes. A single fruiting stalk produces but one fruit.

Variety Grouping. — Pineapple varieties are sometimes grouped into three classes. The Spanish group includes pineapples resembling the Spanish variety. They usually have white flesh and flat eyes, and are not noted for high quality.

The queen group includes varieties having yellowish flesh and pointed eyes. The fruit is usually sweet and rich in flavor. Abachi is one of the prominent varieties. The cayenne group has light yellow flesh and broad, flat eyes. Cayenne is one of the leading varieties of this group.

Variety Characteristics. — A brief comparison of the varieties common in our markets will bring out the following

differences: Many varieties, like Golden and Spanish, are oblong, somewhat conical in form. Cayenne is popular for canning in Hawaii because it is nearly cylindrical and yields many slices of uniform size. Specimens of the small varieties weigh from one to three pounds; those of large varieties run from five to eight or nine pounds. The Porto Rico variety is very large, sometimes weighing fifteen pounds and measuring twelve inches in length. Spanish pineapples are reddish in appearance, while Golden is a deep yellow. The eyes vary from round to rectangular. The flesh varies in color, texture, and flavor: Porto Rico has a fibrous flesh; the flesh of Spanish is white, sweet, and acid; Cayenne is highly flavored, rich, and juicy. Spanish represents a large part of the plantings in Florida, because it is quite hardy, easy to grow, and a good shipper.

REFERENCE READINGS

Ferris, E. B., and Richardson, F. B., "The Satsuma Orange in South Mississippi," pp. 1–14, 1923.

Fraser, Samuel, "American Fruits," pp. 827–828, 840–847, 1924.

Hume, H. Harold, "Citrus Fruits and Their Culture," pp. 1–164, 1915.

Kinman, C. F., "Olive Growing in the Southwestern United States," United States Department of Agriculture, Farmers' Bulletin 1249, 1922.

Ryerson, Knowles, *et al.* "Avocado Culture in California," Part I, California Agricultural Experiment Station, Bulletin 365, 1923.

Shamel, A. D., Scott, L. B., Pomeroy, C. S., and Dyer, C. L., "Citrus Fruit Improvement: A Study of Bud Variation in the Eureka Lemon," United States Department of Agriculture, Bulletin 813, pp. 1–6 and 78, 1920.

Shamel, A. D., Scott, L. B., Pomeroy, C. S., and Dyer, C. L., "Citrus Fruit Improvement: A Study of Bud Variation in Washington Navel Orange," United States Department of Agriculture, Bulletin 623.

Tanaka, Tyozaburo, "A New Feature of Bud Variation in Citrus," United States Department of Agriculture, Circular 206, pp. 1–6, 1922.

Vosbury, E. D., and Robinson, T. Ralph, "Culture of Citrus Fruits in the Gulf States," United States Department of Agriculture, Farmers' Bulletin 1343, pp. 8–16, 1923.

Vosbury, E. D., and Winston, J. R., "Pineapple Culture in Florida," United States Department of Agriculture, Farmers' Bulletin 1237, 1921.

CHAPTER XX

NUT FRUITS

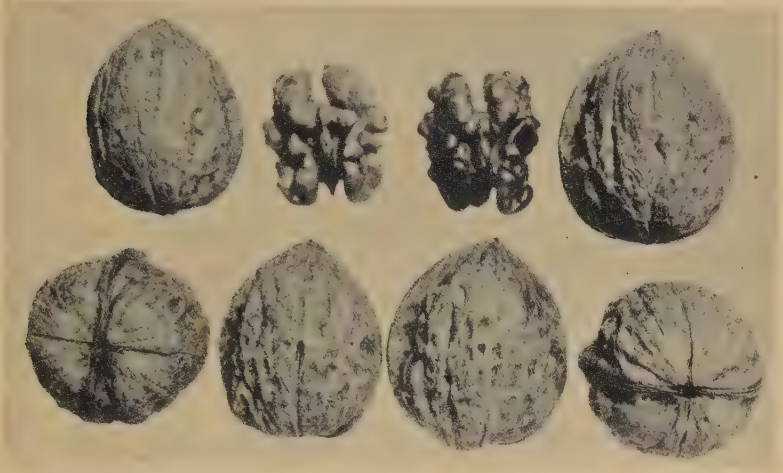
The American people are fond of many kinds of nut fruits, but only three kinds are cultivated to any extent in this country. The almond and walnut are widely grown in California. The pecan is indigenous to the Mississippi Valley and is being widely cultivated in many of our southern states. Texas easily leads in pecan production, although many of the trees are unnamed seedlings. The consumption of these three nuts has more than doubled in the last ten years. We should expect some increase in consumption of cultivated nuts as our supply of wild nuts decreases. Chestnut blight has destroyed our supply of chestnuts over much of the northeastern United States.

WALNUT

The so-called English walnuts of our markets really originated in Persia. Hardy varieties can be grown over much of the eastern part of our country, as far north as New England. Commercial walnut production is confined to California, small areas in Oregon, and some of our southern states. " Budded " grade walnuts bought in the market are likely to be of either the Placentia or the Ehrhardt variety. Many of our other varieties are sold under their variety names.

External Characters. — A comparison of walnut varieties shows many differences in size, shape, and other external characters. Eureka is large and striking in shape, most specimens being slightly obconic and very elongated, with nearly parallel sides. Specimens of Payne tend to be pointed, while Placentia and Ehrhardt are more oval. It is claimed that Placentia bud wood originally came from more than one tree. Perhaps this is why the nuts vary

from oval to round and from rough to smooth in appearance. Color of shell influences selling quality, but is affected by the bleaching process.



Courtesy L. D. Batchelor.

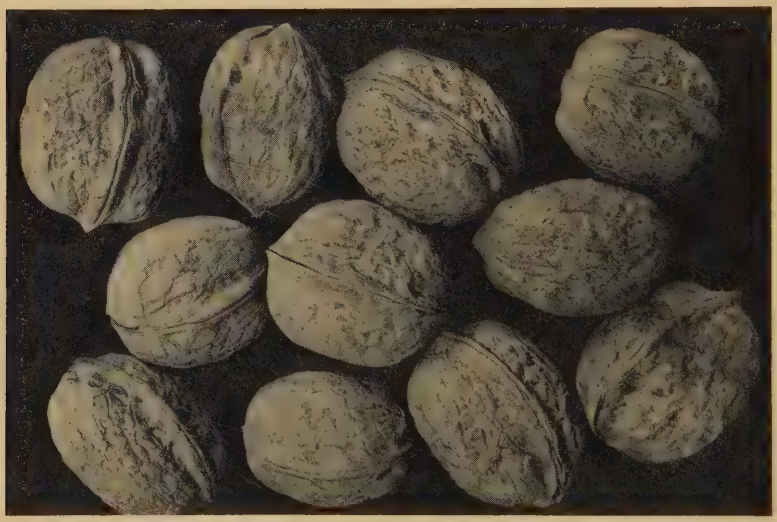
FIG. 101. — Specimens of the Payne variety. Payne nuts often sell at a small premium.

Shell Characters. — " Seal " is a very important variety character among walnuts. Well-sealed nuts keep, handle, and ship better. Placentia and Concord tend to be poorly sealed. The partial cracking that occurs in Placentia nuts may be observed in the illustration of this variety. Eureka nuts are about as well sealed as any variety we grow.

Thickness of shell is another striking character. Placentia and Franquette have shells that are thin but strong. Eureka and Grove have heavy shells. In most good varieties the weight of the shell is about half the weight of the whole nut.

The cracking quality of walnuts usually runs high, much higher than that of some of our other nuts. Placentia nuts crack easily. Ehrhardt kernels are easy to separate from the shell, because of the shallowness of their convolutions.

Kernel Characters. — Franquette is said to be one of the best varieties grown, as far as the quality of the kernels is concerned. Eureka kernels have a flavor that is rich and free from astringency, but they fail to fill out perfectly when grown in a dry climate. Concord has deep convolutions in the kernel. Color, flavor, and ability to fill out perfectly are the more important commercial characters of kernels. Franquette and Grove usually have lighter-colored kernels than Ehrhardt and Placentia. Payne is noted for its mild flavor.



Courtesy L. D. Batchelor.

FIG. 102. — Specimens of the Placentia variety. Note the poor sealing of some of the nuts. Placentia is the leading variety of southern California. There are several strains of this variety.

Tree Characters. — The grower's selection of varieties is influenced by the market demand for the nuts, and by production and tree characters. Eureka will usually outsell Placentia, but is less productive during the early life of the tree. Ehrhardt appears to be less troubled with blight than Placentia. Placentia tends to be less productive and to yield darker kernels in central California than in southern sections. In brief, Santa Barbara soft-shell varieties, like

Placentia and Ehrhardt, are more popular in southern California. Varieties of French descent, like Payne and Franquette, are more popular in central sections.

SOME NOTES ON WALNUT VARIETIES

Good Points	*Bad Points*
CONCORD	
Good grower.	Poorly sealed nuts.
Annual cropper.	Yields poorly in southern sections.
Starts to bear early.	

Does well in central California.

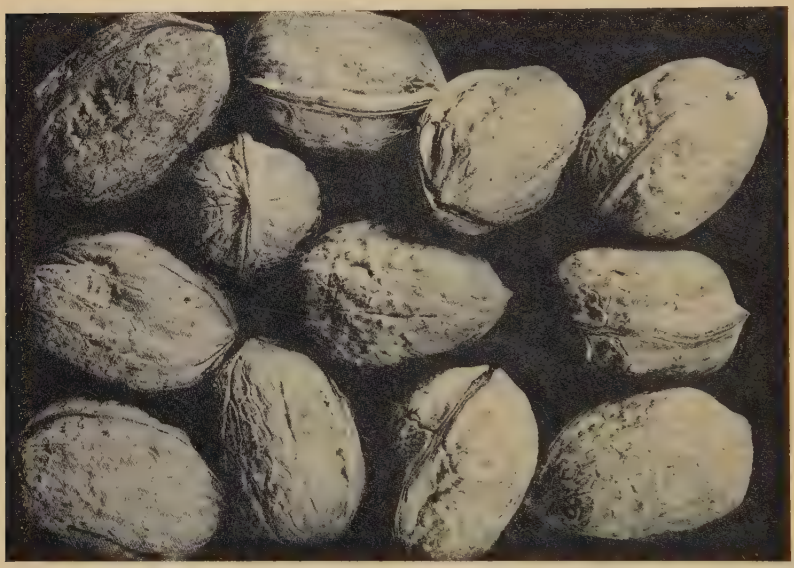
Courtesy L. D. Batchelor.

FIG. 103. — Franquette walnuts.
The Franquette, Mayette, Concord, and Payne varieties are of French ancestry. Franquette nuts sell nearly as high as nuts of the Eureka variety. Franquette is a leading variety in France.

EHRHARDT	
Heavy producer.	Comparatively new.
Nuts sell readily for wholesale trade.	Blights in nursery row.
Easily propagated.	

A Santa Barbara soft-shell variety that is likely to compete with Placentia.

Good Points	*Bad Points*
Eureka	
Nuts sell at a premium.	Comes into bearing late.
Blossoms late.	Late ripening.
Nuts well sealed.	Kernel not perfectly filled out when grown in dry climate.
High quality.	



Courtesy L. D. Batchelor.

Fig. 104. — Eureka walnuts. This variety has strikingly shaped nuts of high quality. It is considered about second in popularity among walnut growers.

Franquette	
High quality.	Light cropper.
Blossoms late.	Slow grower.
Keeps and handles well.	Comes into bearing late.
	Late ripening.

Likely to be replaced by more heavily producing varieties.

Grove	
Heavy bearer.	Comparatively new.
High quality.	
Comes into bearing young.	
Blossoms late.	

Good Points	*Bad Points*
Payne	
Comes into bearing young.	Very subject to blight.
High quality.	Slow grower.
Heavy producer.	Nuts run small on old trees.

Considered valuable as a filler tree where blight is not bad.

Courtesy L. D. Batchelor.

Fig. 105. — Specimens of Grove walnuts. Grove is usually listed as comparatively new and promising.

Placentia	
Heavy and regular bearer.	Blights badly.
Well-known.	Nuts poorly sealed.
Easily propagated.	More than one strain.
Good nut characters.	Dark kernels in central California.

Placentia is the leading variety of southern California.

PECAN

The pecan is one of the few native American nuts that is being widely cultivated. Named and selected varieties are rapidly replacing seedling groves, although the acreage of seedling pecans is large. The better pecan varieties are in a very marked degree superior to most of the wild crop. Already the pecan ranks second among our nut fruits in production, and promises to equal the walnut when named varieties represent a larger part of the crop.

Pecan Variety Adaptation. — The accompanying outline map suggests the approximate extent of the pecan growing area and some of the better varieties adapted to each sec-

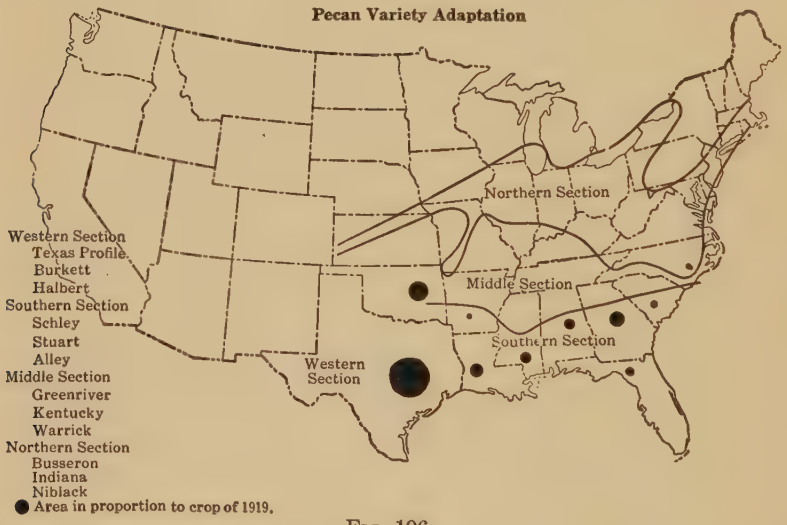


FIG. 106.

tion. Length of growing season, humidity (including prevalence of pecan scab), and winter temperatures are the more important factors influencing pecan growing. In general, the three southern sections are likely to be better adapted to commercial pecan production. Home plantings of pecans should succeed reasonably well in most parts of the northern section. The pecan (*Hicoria pecan*) belongs to the hickory family and is adapted to fertile river bottom land.

External Characters. — A comparison of a number of varieties, including some seedling nuts, will give us a fair conception of variety characters. Pecan nuts show considerable variation in form, some being nearly spherical and others very oblong. Most varieties tend to be ovate in form. Bradley is ovate-oblong; Stuart is oblong; and Schley is oblong-ovate. Van Deman and Success are representative of the large-sized varieties. Some seedling nuts are not more than three-fourths of an inch long. San Saba nuts are considered too small for commercial crackeries. Color and markings may be found helpful in identifying varieties. Schley has two broad depressions on opposite sides near the base. Seedling nuts are often reddish brown in color, while Schley is a lighter brown.

Shell Characters. — We often hear of "paper-shell" pecans, but it is possible for the shell to be too thin for commercial purposes. Stuart and Niblack have moderately thick shells; Alley and Schley have thin shells. Cracking quality is a very important character of pecan varieties. Alley is popular for making candies because the kernel separates easily from the shell. Delmas cracks easily. Schley has a brittle shell which sometimes cracks too easily. Sovereign illustrates poor cracking quality. The kernels of San Saba are so plump that they interfere with the cracking of the nuts.

Kernel Characters. — Plumpness, oil content, and flavor are important commercial characters. Schley is noted as a standard in quality and as one of the richest varieties in oil content. Mobile has plump kernels when grown on young trees, but fills poorly on older trees. Bradley is said to fill poorly in some sections. Nelson is a well-known offender in this respect. Frotscher often has dark kernels.

Tree Characters. — Pecan scab is one of the most serious diseases of the pecan tree. Many splendid varieties lack resistance to this disease. Pabst, Delmas, and Georgia Giant are quite susceptible to scab, while Stuart is considered quite resistant. The age at which the tree comes into bear-

ing and the yields have a decided influence on choice of varieties. Success, Mobile, and Moneymaker are noted for early bearing, often bearing a few nuts at four or five years of age. Stuart and Pabst come into bearing more slowly, although making a strong growth while young. Schley is variable in bearing habits, although it usually starts young. Frotscher has brittle wood, which often results in much breakage.

NOTES ON SOME PECAN VARIETIES

Good Points	*Bad Points*
Alley	
Good producer. Cracks easily. Quality good.	Slightly subject to scab.

A promising variety that is gaining in favor.

Burkett	
Comes into bearing young. Excellent quality. Bears heavily.	Comparatively new.

A promising variety for the western pecan section.

Greenriver	
Hardy to cold. Matures in a short season.	Only fair nut characters. Comparatively new.

A good variety in the North, and excellent for home use.

Halbert	
Heavy bearer. Comes into bearing young. High-quality nuts. Very thin shell.	Scabs badly in humid sections. Small nuts.

One of the best varieties for the western section.

Pabst	
Good producer. Comparatively free from insects and diseases. Good-quality nuts.	Comes into bearing late.

Good Points	*Bad Points*

SCHLEY

Standard in quality.	Variable in bearing habits.
Comes into bearing young.	Slightly subject to scab.

The most popular variety for many parts of the southern section.

STUART

Adapted to a wide range of conditions.	Poor cracking quality.
	Tends to come into bearing late.
Good-quality kernels.	Medium thick shell.
Comparatively free from disease.	

Widely planted and generally ranked second in the southern section.

SUCCESS

High-quality nuts.	Requires a fertile soil.
Good producer.	
Comes into bearing early.	

Generally ranked third among varieties in the southern section.

WARRICK

High-quality.	Comparatively new.
Good bearer.	Small nuts.
Hardy and matures in a short season.	

A promising variety for northern plantings.

ALMOND

The almond ranks third among cultivated nut fruits of the United States. This nut fruit bears a close resemblance to the other members of the *Prunus* group, especially the peach. The peach is often used as a stock on which to bud the almond. Most of the American crop of almonds comes from California, although almond trees will grow in many parts of our country. The almond, like many of our Japanese plums, blossoms very early in the spring.

This alone prevents it from fruiting in many parts of eastern North America. In addition to freedom from spring frosts, the almond demands a dry atmosphere (to reduce fungi troubles) and winters as mild as those required by peach trees.

Hull or Involucre. — In most cases it will be necessary to study almond varieties through samples shipped from growing districts or through specimens found in the market, most of which are shelled. A comparison of varieties reveals some interesting differences. The hull of the almond corresponds to the flesh of the peach. When the fruit is ripe, this hull splits and generally opens on drying. In some specimens of Nonpareil the hull closes around the nut, forming a "stick tight." Such specimens are usually cracked and sold as shelled almonds. Ease of hulling is an important factor in almond production. Most varieties are hulled by machinery.

Size and Form. — Texas may be taken as an example of an almond variety that is below medium size, being about two-thirds of an inch thick, about an inch wide, and an inch and one-fourth long. IXL specimens are usually large, averaging about one and one-half by one and three-fourths inches. The Jordan variety is even larger. Size varies greatly with season and load on the trees.

Most varieties of almonds have more or less of a wing on the ventral side of the nut. Specimens of California almonds often have broken wings, exposing the kernels. The dorsal surface of Jordan is almost straight. The general shape is usually more or less flattened and varying from oval in Drake to long and slender in Jordan. Apex, base, and stem scar are other identification characters.

Shell. — The market demands are for bright, yellow shells, and the desired color is secured by bleaching with sulfur fumes. This process reduces the keeping quality of the nuts. The more important variety characters of almond shells are thickness and structure. Varieties are usually classified as paper-shell, soft-shell, standard, and

hard-shell. Nonpareil and California are the leading varieties of the paper-shell group. IXL and Ne Plus Ultra lead among the soft-shell or crumbly-shell varieties. Drake and Languedoc represent soft and hard types of standard-shell varieties. Jordan is a hard-shell variety that commands a high price among imported shelled almonds. Cracking quality varies considerably. Paper-shell varieties crack easily, but are damaged by birds and worms. California, a paper-shell variety, is often poorly sealed. The Jordan variety fails in this country because it cannot be cracked by machinery. This is partly because the shell is very hard and partly because the kernel fills the entire shell cavity.

Kernel. — The kernel of the almond is surrounded by a thin membrane called the pellicle, which varies from straw-colored to brown and from rough to smooth in appearance. The shape of the kernel often resembles the shape of the shell, and can be described in a similar way. It is desirable to have only one kernel per nut in commercial almond production. Drake has many double kernels, while Nonpareil has few. Jordan is probably our highest-flavored almond, and is usually described as sweet, oily, and rich. Bitter-flavored varieties are used in the extraction of almond oil. " Neutral " is a term commonly used to describe the flavor of IXL and Drake. Texas kernels have a faint trace of bitterness. Nonpareil is usually listed as very good in quality, Ne Plus Ultra as only fair, and California as good.

Selection of Varieties. — A large proportion of the almonds imported into this country are shelled. Early-ripening varieties often avoid some of this competition. Our local production has been largely for the unshelled almond trade, although we are beginning to sell considerable amounts as shelled almonds. Nonpareil is the best-known variety for California conditions. IXL is the most popular variety for the unshelled almond trade. Drake and Ne Plus Ultra are also prominent varieties.

NOTES ON SOME ALMOND VARIETIES

Good Points	*Bad Points*
California	
Almost entirely free from double kernels.	A light cropper.
A large amount of kernel to shell.	Damaged by birds.
Easy to shell.	Poorly sealed nuts.
Drake	
Very heavy producer.	Only fair quality.
Good-sized nuts.	Ripens rather late.
Adapted to wide range of conditions.	
Eureka	
Kernels resemble those of Jordan.	Not as good quality as Jordan.
Ripens early.	Still on trial.
Good nut for confectionery trade.	
IXL	
Well-known in the unshelled almond trade.	Light producer.
Sells at a premium.	Tends to produce gummy nuts.
Few double kernels.	Blossoms tender to frost.
Jordan	
High-quality kernels.	Hard to shell.
Large, plump kernels.	Small percentage of kernel to shell.
Sells at a premium.	Does not seem to be adapted to our conditions.
Ne Plus Ultra	
Attractive nuts for the unshelled almond trade.	Tends to produce gummy nuts.
Well-known.	Not adapted to wide range of conditions.
Nonpareil	
Good for the shelled almond trade.	Hard to hull.
Heavy and regular producer.	
Adapted to wide range of conditions.	
High-quality.	

Good Points	*Bad Points*
TEXAS	
Heavy bearer.	Late-ripening.
Good pollenizer.	Low quality.
Bears while young.	Small size.
	Over-planted.

QUESTIONS

1. Compare Ehrhardt with Placentia as commercial varieties of walnuts.
2. What are the more important factors in pecan variety adaptation?
3. Why is almond growing not more popular in the eastern part of the United States?
4. What are the disadvantages of very thin-shelled almond and pecan varieties?
5. What are the requirements of a good variety of pecans for the confectionery trade?
6. Compare Schley to San Saba as commercial varieties of pecans.

REFERENCE READINGS

BATCHELOR, L. D., "Walnut Culture in California," California Agricultural Experiment Station, Bulletin 379, 1924.

FIROR, J. WILLIAMS, "Pecan Growing in Georgia," Georgia Agricultural Extension Service, Bulletin 255, 1922.

STUCKEY, H. P., and KYLE, E. J., "Pecan Growing," pp. 215–228, 1925.

TAYLOR, R. H., "The Almond in California," California Agricultural Experiment Station, Bulletin 297, 1921.

CHAPTER XXI

NOMENCLATURE OF FRUITS

Every science has a nomenclature peculiar to itself, although the terms it employs may be used in related sciences to express slightly different concepts. Thus, the term "fruit" has one meaning in Botany and quite a different one in Pomology. The nomenclature of Systematic Pomology is best studied incidentally, as the terms occur in the study of the science. In this way a few new terms are learned every day and this phase of the work becomes comparatively easy.

Binomial System of Nomenclature. — Another phase of nomenclature is the naming of plants. In order to appreciate the importance of this matter, we need only reflect that a trinomial system is used, for the most part, in naming children, and that, in spite of this, the Smiths and Joneses find it hard to avoid confusion. It is only necessary to read some of our old herbals to realize that the names of plants were also much confused at one time. This was because the early gardeners used a monomial system of naming plants. The common names of plants, like apple and larkspur, are survivals or descendants of the names given under this early system. The first step in improving this condition was the addition of the name of the originator of the plant or of the author who first described it. Thus, Steele's Red Winter was a name at one time applied to Baldwin apples. The greatest advance in the science of naming plants is that recorded by Linnæus in his "Species Plantarum," published in 1753. In this publication our present binomial system of naming plants was used. Thus, *Prunus Cerasus*, Linn., is our sour cherry, and *Vaccinium corymbosum*, Linn., is our swamp or cultivated blueberry, "Linn." being the accepted abbreviation of Linnæus' name.

The binomial system of naming is universally used for all kinds of horticultural plants and for plants in general. It is not used, however, in designating our varieties of horticultural plants. To illustrate, "*Pyrus Malus*, Linn., variety McIntosh, Lyons," is the technical way of referring to that beautiful aromatic apple called McIntosh.

Code of Vienna. — At the present time, there is considerable confusion in the use of the above system of names. This is because some students of plants use one set of names and others use another. As a student, the author learned about *Prunus triflora*, our Japanese plums, but the same plums are also referred to as *Prunus salicina*. We have reason to hope that this confusion is temporary, since it is due in part to the corrections made necessary by the adoption of the Code of Vienna by the International Horticultural Congress held at Brussels in 1910. The object of most of these corrections was to make usage conform to the rule of priority, which requires that the first published name shall become the correct name for any kind of plant. The Code of Vienna represents an attempt to establish a uniform world system of naming plants and was framed in 1905 at Vienna.

Rules for Naming Species. — Whether the Code of Vienna or some other system be followed in naming a plant, the procedure is essentially the same. The person who finds and names the new plant places his own name after the generic and specific names he assigns to the plant. Thus, *Prunus maritima*, Marshall (usually abbreviated to *Prunus maritima*, Marsh.), is the beach plum of New England, which was named by Marshall. This really makes the system almost trinomial, but furnishes a means of locating the original description of the plant called *Prunus maritima*. A second rule in practically all codes of nomenclature is that of priority, which was referred to above. In cases where more than one name has been published for a given plant, the first name published becomes the official one, and all other names become synonyms. Ragan lists the

following synonyms for the variety Baldwin: Butters, Felch, Baldwin Pippin, Late Baldwin, Mahaska, Pecker, Red Baldwin, Red Graft, Steele's Red Winter, and Woodpecker. Plant students use the following rules regarding the use of capital letters: (1) All generic names begin with a capital letter, as *Vaccinium* (blueberry) and *Fragaria* (strawberry). (2) All names of species begin with a small letter, except those named from persons or places, or those formerly having generic rank, as *Pr. Munsoniana* (Wild Goose plum) and *Pr. Persica* (peach). This rule is not followed by pomologists in referring to varieties of fruit plants.

Nomenclature of Fruit Varieties. — The above system of naming plants is not adequate for naming varieties. A variety in the pomological sense includes all plants that are the vegetative offspring of a single plant, except bud sports. There is a slight difference between this meaning of the term variety and that which it has when applied to sexually propagated plants like corn or tomatoes. Fortunately, from a nomenclatural point of view, the fruit grower has not been troubled to any extent by strains of fruit varieties. We have a few strains, such as Red Gravenstein or Red Rome, but these are usually sports. They can not be called strains in the sense that the early or late strains of vegetable varieties are so called. Some strains are found among citrus fruits. Until a comparatively recent date, the nomenclature of fruit varieties was commonly controlled by a recognized horticultural authority. A. J. Downing and P. Barry were authorities on the naming of fruit varieties in their day. As the fruit industry grew, the control of variety names passed to the American Pomological Society. This organization, through its Code of Nomenclature, has been considered the final umpire since about 1865. The following is the 1923 version of this Code:

CODE OF FRUIT NOMENCLATURE

AMERICAN POMOLOGICAL SOCIETY

This code aims to establish a simple and clear system of pomological nomenclature that shall be appropriate and stable. Accordingly it is urged that all persons naming new varieties of fruits choose simple one-word names that are fittingly expressive of some character, quality, place, person, or event associated with the source, time, place or origin of the variety.

The paramount right of the originator, discoverer, or introducer of a new variety to name it, within the limitations of this code, is recognized and established.

The term "kind" as herein used shall be understood to apply to those general classes of fruits which are grouped together in common usage without regard to their exact botanical relationship, as apple, cherry, grape, peach, plum, raspberry, etc

I. FORM OF NAMES

1. Names of new varieties shall be of one word preferably, but two words may be accepted. Names of existing varieties shall not be changed in such a way as to lead to confusion or loss of identity.

2. The spelling and pronunciation of a variety name shall be the same as that of the person, place, substance, circumstance, or quality from which it is derived.

3. A possessive noun shall not be used.

4. Initials should not be used as a part of a variety name.

5. A name shall not be formed by the compounding or hyphenating of two or more existing names, but this does not prohibit the formation of a one-word name by the use of parts of two or more existing names. The hyphen shall not be used between the words of a name. Thus, neither Bartlett-Seckel nor Bar-Seck may be used, but Barseck is admissible.

6. Such general terms as seedling, hybrid, beurre, damson, pippin, rareripe, bigarreau, should not be used.

7. A variety imported from a foreign country should retain its foreign name, subject only to such modification as is necessary

to conform it to this code, and provided that names having a recognized English equivalent may be, but are not necessarily, so rendered.

8. The name of a person shall not be applied to a variety in his lifetime without his consent.

9. The name of a deceased person shall not be applied to a variety except through formal action by some competent pomological body, preferably that with which the deceased was most closely associated.

II. PRIORITY, USAGE AND DUPLICATION

10. The name first published for a variety shall be the accepted and recognized name except when contrary to the provisions of this code; but names established by usage in American pomological literature may be retained even though they do not conform to these rules.

11. A name once used shall not be used again for a variety of the same kind, except that a name once established through long usage for two or more American varieties shall not be displaced for either or radically modified unless a well-known synonym can be used in its place; or when no such synonym is available, the varieties bearing identical names may be distinguished by the addition of the name of the author who first described each, or by some other suitable distinguishing term.

III. PUBLICATION, DESCRIPTION AND CITATION

12. Publication consists in: (1) The public distribution of a printed name and description or characterization of the fruit; (2) the publication of a new name for a variety described elsewhere under a different name, number, or other untenable designation, the synonym being given.

13. Publication of a name may be made in any book, bulletin, report, trade catalog or periodical of public distribution and bearing date of issue.

14. But a varietal name may be established by current usage in the locality of its origin, when well-known, and shall be considered as published and have precedence over a later printed name for the same variety.

15. Complete description of a variety consists of a detailed

account of the characteristics of the plant, foliage, flowers, fruit, and habit of growth, so as to distinguish it from other varieties of similar appearance.

16. The type of a variety is the fruit of the original plant; and type descriptions or illustrations shall be made from material produced by the original plant, or when this is not available, from a plant as near as possible to the original in asexual reproduction, and preferably grown in the same pomological region.

17. The full citation of a variety name consists of the name of the author who first described the variety, and the name, page, and date of the publication in which the description first appeared. An author-citation following a name refers to the author of the original description of a variety: e.g., Turley, C.P.C. Names of authors and published works may be abbreviated, in accordance with the usages of this Society.

Adopted November 8, 1923, at the
New York meeting of the Society.

The Rule of Convenience. — As there is no means of enforcing the provisions of this Code, its authority rests upon convenience and the weight of public opinion. The importance of convenience may be seen in the tendency of the public to shorten a long name, as in the case of children's nicknames. One cannot walk through a busy market without hearing Rhode Island Greening referred to as Greening. Unfortunately, in this latter case, there are many greenish apples that may be called " Greening."

Possessives, initials, and similar additions to variety names are often used because of their advertising value. Most fruit growers had heard of J. H. Hale; therefore the use of his initials in the name of the variety Hale had a certain advertising value. Likewise, the forming of a new name from one or more existing names will give a new variety considerable advertising. Golden Delicious is a good illustration of this. This advantage is usually temporary, and often results in some confusion.

Varieties with Foreign Names. — An attractive name is a great help to a new variety. Many of the author's friends from Pennsylvania admire the variety Smokehouse among

apples. However, few grow the variety, although it has merit. The name is not distinctive, nor does it help to bring up pleasant memories.

Few of our varieties of fruits are richer in decorative names than pear varieties. This is because many are of foreign origin. Bosc and Angoulême should be called Beurre Bosc and Duchesse d'Angoulême respectively, for they are so called in Europe. The author is inclined to think that where convenience conflicts with the rule regarding foreign names, the layman will yield to convenience. Hence, reference has been made to these varieties as (Beurre) Bosc, and Angoulême (Duchesse d'Angoulême) in this book.

Priority and Nomenclature Exercises. — The operation of the priority rule is illustrated by the following example: One of our strawberry breeders originated a variety of strawberries, but could not be induced to name it. It was grown locally under the breeder's name. A nurseryman distributed the plants to the world and thus acquired the right to name the variety. This has been repeated many times in the history of varieties of fruit.

Many of the remaining items in the above code are self-explanatory.

The following is a splendid exercise in applying nomenclatural rules. Secure a collection of nursery catalogs, both foreign and domestic. Let one student look up the Montmorency group of cherries, and another the " Seckel Bartlett " group of pears, or the Gage group of plums, first, finding out the correct number and names of varieties, and second, noting violations of the Nomenclatural Code. The students should then report to the class. One or two assignments of this kind will help each student to appreciate nomenclature.

GLOSSARY OF POMOLOGICAL TERMS

Abaxile. — Away from the axis. An abaxile core is one that does not have flesh up to the axis.

Abortive. — Imperfectly developed; not viable (said of seeds).

Abrupt. — Changing suddenly, not tapering.

Acid. — Possessing a sour taste.

Acuminate cavity. — One having sides that meet the stem in a long, narrow angle.

Aggregate fruit. — A fruit composed of pistils that were distinct in the flower. *Example:* raspberry.

Alternate. — Placed singly, not opposite or whorled.

Anther. — The pollen-bearing part of the stamen.

Anthesis. — The act of flowering; flowering period.

Anthocarpous. — A solid mass composed of flowers and fruit. *Example:* mulberry.

Apetalous. — Having no petals.

Apical. — At the top or apex.

Appressed. — Pressed closely against another part, so as to be flattened. *Example:* Northern Spy has appressed buds on current shoots.

Areolar. — Surrounded by something resembling a halo. An areolar dot is one that is surrounded by an area lighter or darker than the rest of the fruit.

Armed. — Provided with thorns, spines, or similar structures, such as the thorns of blackberries.

Asexual. — Without sex.

Astringent. — Having a flavor that tends to pucker the mouth.

Axile. — Relating to or on the axis. An axile core is one that has flesh up to the center or axis of the apple.

Baccata. — The Siberian crab-apple. *P. baccata* crossed with apple is our cultivated crab-apple.

Basal stamens. — Stamens located near the base of the calyx tube.

Base. — The lower part. The end near the point of attachment of fruit, leaf, or branch.

Basin. — The depression at the blossom end of pome fruits.

Beak. — A point. The beak of a peach is the pointed structure opposite the stem end.

Berry. — A pulpy, indehiscent fruit containing few or many seeds.

Biennial bearing. — Producing a crop every other year.

Bilobed. — Two-lobed.

Bisexual. — Producing both stamens and pistils.

Blade. — The expanded part of petal or leaf.

Bloom. — A waxy or greasy substance on fruits.

Bouquet. — A blending of flavors. (Commonly used in referring to orange flavors.)

Bract. — A much reduced leaf.
Brush. — The fibrovascular bundles that attach a grape berry to the pedicel.
Bud. — An incipient or nascent shoot; the resting stage of a shoot, flower, or leaf.
Bush. — A low and thick shrub.
Calyx. — The outer circle of floral envelopes.
Calyx tube. — The tube-like structure in pomaceous fruits that contains the dried-up pistils and stamens.
Carpel. — Foliar unit(s) of a pistil. Most apples contain five carpels.
Catkin. — A scaly-bracted spike with deciduous flowers.
Cavity. — The depression at the stem end of a fruit.
Cell. — One of the ultimate compartments of which plants or parts of plants are composed. Oil cells of citrus fruits are compartments in the rind containing oil.
Chalaza. — The depression near the center of a grape seed.
Cion. — The bud or branch used in grafting.
Cirrhus. — Same as **cirrus.**
Cirrus. — A tendril.
Clasping. — Gripping. Core lines are said to be clasping when attached above the base of the calyx tube.
Complete flower. — One that has all parts present.
Compound leaf. — One that consists of two or more separate (or obsolete) leaflets.
Convergent. — Coming together. (Often used to describe calyx lobes.)
Cordate. — Heart-shaped.
Corolla. — The inner circle of floral envelopes.
Crenate. — Obtusely toothed. (See **serrate.**)
Cross. — The offspring of any two flowers that have been fertilized.
Cuticle. — The external rind or skin of a plant or part of a plant.
Deciduous. — Falling. A deciduous calyx is one that falls before the fruit is ripe.
Depressed. — More or less flattened from above.
Divergent. — Turning away. Calyx segments are said to diverge when they turn out from the point of attachment.
Drupe. — A fleshy, one-seeded, indehiscent fruit; a stone fruit.
Drupelet. — One of the parts of a raspberry or blackberry; one drupe in an aggregate fruit made up of drupes.
Emarginate. — Indented. Emarginate carpels are indented at either top or bottom, but are too narrow to be called cordate.
Entire. — Having a margin that is not indented in any way.
Envelope (of citrus fruits). — The fibrous tissue containing the juice sacks.
Essential Organs. — Pistils and stamens.
Evergreen. — Retaining foliage throughout the year.
Fertile. — Bearing seed.
Fertilization. — The act of union of sperm and egg cells.
Foxy. — Having a flavor thought to resemble the odor of a fox's den.
Fruit. — The ripened pericarp and attached parts.

Funnel-form. — Having the shape of a funnel. (Often said of a calyx tube.)

Furrowed. — Having longitudinal channels or grooves that are deeper than wrinkles.

Generation. — Period from birth to death.

Glabrous. — Not hairy or pubescent.

Gland. — An appendage common on leaves of stone fruits.

Habit. — General condition or tendency. (Often used to refer to mode of growth.)

Hardy. — Resistant to adverse conditions, especially to cold.

Herbaceous. — Not woody.

Hermaphrodite. — Bisexual; having stamens and pistils in the same flowers.

Hesperidium. — An orange-like fruit.

Hull (of strawberry). — The sepal-like parts at the base of a strawberry.

Hybrid. — A plant resulting from a cross between two or more plants.

Imperfect flower. — One that lacks either stamens or pistils.

Indigenous. — Native to the region or country.

Internode. — The part of a stem between two joints.

Juice sacks (of citrus fruits). — The more or less spindle-shaped structures composing the flesh of citrus fruits.

Lanceolate. — Lance-shaped. (Often used to describe leaf shapes.)

Leaf-stalk. — The stem or petiole of a leaf.

Mamelon. — Pointed. (Often used in reference to apex of fruit.)

Mamme figs. — The winter crop of figs.

Mammoni figs. — The summer crop of figs.

Mammiliform basin. — One with peculiar fleshy protuberances about the base of the calyx segments.

Marginal stamens. — Stamens located near the outer margin of the calyx tube.

Midrib. — The main rib; the central rib-like structure of a leaf or leaf-like part.

Mucronate. — Terminating in a sharp point. Mucronate carpels terminate in a sharp point at either top or bottom.

Node. — A joint.

Nubbin peaches. — Small, late-maturing peaches that do not contain viable seed.

Nut. — An indehiscent, hard and bony fruit.

Nutty. — A kind of flavor. Nut-like flavor.

Obconical. — Inversely conical; increasing in size from point of attachment.

Oblique. — Slanting. (Often used to describe apples with core not at right angles to horizontal diameter.)

Oblong. — Having the length greater than the breadth.

Obovate. — Inversely egg-shaped.

Obtuse. — Blunt. An obtuse cavity is one that has sides forming an angle of more than 90 degrees.

Ovate. — Egg-shaped. Ovate fruits are somewhat smaller at the attached end.

Ovule. — The seed of a plant in its rudimentary state.

Pedicel. — The little footstalk of a fruit, flower, or leaf. The grape berry is attached to a pedicel.

Peduncle. — The stem or stalk of a cluster of fruits, flowers, or leaves.
Pellicle. — The thin membrane that covers the kernel of an almond.
Perfect flower. — One that has both stamens and pistils.
Petiole. — Leaf-stalk.
Pistil. — The female organ of a flower.
Pistillate. — Having pistils and no stamens.
Pollen. — Spores or fertilizing material found in the anthers of flowers.
Pome. — An apple or a fruit resembling an apple, such as the quince, crab-apple, and pear.
Profichi figs. — The spring crop of figs.
Pubescent. — Downy; covered with short, soft hairs.
Pyriform. — Pear-shaped.
Raphe. — The ridge or cord connecting the chalaza and hilum on a grape seed.
Receptacle. — Torus.
Recurved. — Bent backward.
Reflex. — Abruptly recurved.
Reinforced fruit. — One that has other parts grown to the pericarp.
Reniform. — Kidney-shaped.
Rudimentary. — Very slightly developed.
Runner. — A slender, trailing, rooting shoot.
Scarf skin. — A whitish pigment appearing to extend over the outer color in apples and other fruits.
Scion. — Same as **cion.**
Seed. — A ripened ovule.
Segment. — A part cut off. (Sometimes used to refer to the parts of an orange.)
Selfed. — Pollenized by pollen from the same flower or variety.
Serrate. — Having sharp, saw-like teeth pointed forward. (See **crenate.**)
Sessile. — Not stalked. A sessile core is one attached directly to the stem.
Shoot. — Any growing twig.
Shot grapes. — Small seedless grape berries found among berries that contain seed.
Shrub. — A low, woody plant with several stems from the same root.
Spicy. — Having a taste similar to the smell of aromatic fruits.
Sprightly. — Sufficiently acid to be refreshing.
Stalk. — The stem.
Stamen. — The pollen-bearing organ.
Stem. — The axis upon which the leaf, flower, or plant is borne.
Stock. — The trunk that receives a graft; the parentage.
Stone. — The " pit " or hard shell containing the seed of a stone fruit.
Sucker. — A shoot arising from the roots.
Suture. — A natural division; the groove running lengthwise in stone fruits and sometimes in pomaceous fruits.
Taxonomy. — The department of science that embodies the principles of classification.
Tendril. — A slender, spiral extension of a plant by which it attaches itself to objects.
Teratology. — The study of abnormal growths.

Torus. — The part of the flower on which the carpels stand.
Trifoliate. — Having three leaves.
Truncate. — Cut off at the end.
Ventral streak. — A brownish discoloration found on the inner ventral surface of an almond shell.
Vinous. — Wine-like; rich and highly flavored.
Watercore. — A pathological condition in apples in which the intercellular spaces are filled with liquid.
Wing. — The thin ridge or flange-like part of the shell on the ventral side of an almond.

INDEX

A

Apple, fruit study of varieties
abaxile core, 15
basin, 13
bloom, 11
calyx, 13
calyx tube, 15
cavity, 13
cellulose, 17
color, 11
core, 16
descriptions, 20
dots, 12
flavor, 17
flesh, 17
identification contests, 20
mucronate, 15
pectic material, 17
scarf skin, 11
shape, 10
size, 10
skin, 12
stamens, 15
stem, 12
suture, 9
tufted, 17
quality, 18
Apple varieties
Arkansas, 26
Arkansas Black, 26
Baldwin, 20, 24, 27, 44
Ben Davis, 20, 27, 44
Canada Baldwin, 28
Cortland, 28
Delicious, 24, 28, 45
Esopus (Spitzenburg), 28.
Fallawater, 29
Golden Delicious, 29
Grimes (Golden), 24, 29, 45
Jonathan, 21, 24, 30, 45
King David, 30
Apple varieties — *Continued*
McIntosh, 21, 24, 30, 44
Northwestern (Greening), 25, 31
Oldenburg (Duchess), 25, 31, 45
Opalescent, 31
Red Astrachan, 31
Rhode Island (Greening), 31, 45
Rome (Beauty), 25, 32, 45
Roxbury, 32
Spy (Northern), 33, 46
Stayman, 21, 24, 46
Wagener, 33
Wealthy, 24, 33, 45
Williams, 33
Winesap, 24, 34, 44
Winter Banana, 34
Yellow Newtown, 21, 34
Yellow Transparent, 34
Apple variety adaptation, 20
score card, 22, 23
Apple, water-cored, 26
Apples, classification of
Carpenter and Stafford's key, 67
Keil's natural groups, 75
Aport, 75
Baldwin, 75
Ben Davis, 75
Black Gilliflower, 75
Blue Pearmain, 76
Chenango, 76
Early Harvest, 76
Fameuse, 76, 168
Hibernal, 77
Keswick, 77
Lady, 77
Lawver, 77
Limbertwig, 77
Liveland, 78
Longfield, 77
Newtown Spitzenburg, 78
Northern Spy, 78
Oldenburg, 78

Apples, classification of — *Continued*
Ralls, 79
Rambo, 79
Red Astrachan, 79
Red June, 79
Reinette, 79
Romanite, 80
Rome Beauty, 80
Russet, 81
Spitzenburg, 81
Summer Rose, 81
Sweet Bough, 81
Tompkins King, 81
Twenty Ounce, 82
Winesap, 65, 82
Yellow Bellflower, 82
Yellow Transparent, 82
Shaw's key for leaves, 73
using keys, 73
Apricot, 114
Apricot varieties
Blenheim, 114
Moorpark, 115
Newcastle, 115
Royal, 115
Tilton, 115
Artificial classification, 65, 67

B

Blackberry
flavor and quality, 187
flesh characters, 187
plant characters, 188
shapes and colors, 187
Blackberry varieties
Early Harvest, 188
Eldorado, 188
Erie, 189
Iceberg, 189
Kittatinny, 189
Lawton, 189
Mammoth, 190
Mersereau, 189
Snyder, 190
Taylor, 190
Blueberries, 216
color, 218
Blueberries — *Continued*
firmness, 218
flavor and quality, 218
forms, 218
seediness, 218
selection of varieties, 219
time of ripening, 218
Bramble fruits, 182

C

Cherries, 125, 129
Cherries, classification of
Duke, 133
sour
Amarelles, 130, 131
Morellos, 130, 131, 132
sweet, 132, 133
Cherry industry, history of, 130
Cherry, study of varieties, 117
brown rot, 119
character of pits, 118
flavor and quality, 119
flesh characters, 118
shapes, 117
size, 117
stems, 118
suture line and skin, 118
tree characters, 119
Cherry varieties
Duke
May Duke, 121
sour
Dyehouse, 120
Early Richmond, 120
English Morello, 120
Montmorency, 120
sweet
Bing, 122
Black Tartarian, 121
Napoleon, 121
Republican, 122
Schmidt, 122
Windsor, 121
Citrus fruits
grapefruit, 242
grapefruit varieties
Duncan, 242

Citrus fruits — *Continued*
Foster, 242
Marsh, 243
lemon, 243
lemon varieties
Eureka, 244
Lisbon, 244
Ponderosa, 244
Villafranca, 244
orange, 231
flavor and juice, 235
flesh, 234
juice sacks, 232
Kid Glove varieties
Dancy, 239
Ikeda, 239
King, 239, 241
Owari, 239, 240
Satsuma, 239
peel, 233
season of ripening, 236
seeds, 235
segments, 233
size and form, 232
surface, 233
sweet, varieties
Bahia, 236, 240
Parson, 237
Pineapple, 237
Ruby, 238
Valencia, 238
Crab-apple, 82
Crab-apple varieties
Hyslop, 35
Martha, 35
Transcendent, 35
Cranberries
adaptation, 212
color, 213
firmness, 213
flavor and quality, 214
internal characters, 214
size and form, 213
Cranberry varieties
Bennett, 215
Centennial, 215
Early Black, 215
Holliston, 215
Cranberry varieties — *Continued*
Howes, 216
McFarlin, 216
Mathews, 216
Pride, 216
Searl, 216
Currant
adaptation, 203
cluster, 203
color of berries, 204
flesh and seeds, 204
leaf characters, 205
plant characters, 204
size of berries, 204
Currant varieties
Boskoop Giant, 208
Champion, 207
Diploma, 206
London (Market), 207
Naples, 208
Perfection, 206
Red Cross, 207
White Grape, 207
Wilder, 205

D

Development of varieties, 155
blueberry, 165
bud sports of apples, 162
Cape grape, 156
citrus fruit strains, 158
Colonial apple growing, 158
Colonial grape growing, 155
correlated characters, 168
grapefruit varieties, 158
Johnny Appleseed, 160
mass selection, 166
native grape industry, 157
Old Mission grapevine, 156
original Concord grapevine, 155
pecan, 166
plant breeding, 166
strawberry, 162
Virginian, 162
Chilean, 162
Alaskan, 164
sweet cherry, 164

Development of varieties — *Continued*
systematic apple breeding, 160
vinifera grape varieties, 157
Alexandria, 158
Alicante Bouschet, 158
Sultanina, 158
Dewberry, 186
flavor and quality, 187
flesh characters, 187
plant characters, 188
Dewberry varieties
Loganberry, 191
Lucretia, 191
Mayes, 192
Drupaceous fruits, classification of, 124
cherries, 125
Prunus avium, 125, 132.
Prunus cerasus, 125, 132
Prunus serrulata, 132
peaches, 125
Prunus Persica, 125
Prunus Persica, var. nucipersica 125
Prunus Armeniaca, 125
plums,
European
Prunus institia, 124, 128
Prunus domestica, 124
Japanese
Prunus salicina, 124, 129
native plums of America, 124, 128
Prunus Americana, 125
Prunus angustifolia, 124
Prunus hortulana, 125
Prunus maritima, 125, 129
Prunus Munsoniana, 125
Prunus nigra, 125

E

Enzyme activity, 6, 7, 14

F

Fruit exhibits, 150
booths, 153
Fruit exhibits — *Continued*
commercial, 151
educational, 151
non-professional, 151
window displays, 151
Fruit judging, 8, 138
apple identification characters, 138, 139
color, 146
condition, 146
form, 145
nuts, 149
other fruits, 148
principles followed, 147
rules of American Pomological society, 140
score cards, 145
for boxed apple classes, 147
standard of sizes for show apples, 145
texture and flavor, 148
uniformity, 146
Fruit shows, 138

G

Gooseberry, 203, 208
color and shape, 208
flesh and quality, 209
plant characters, 209
size, 208
skin, 209
Gooseberry varieties
Chautauqua, 209
Downing, 210
Houghton, 210
Industry, 210
Oregon, 210
Poorman, 210
Grape, study of varieties
adaptation, 169
color, 172
compactness of cluster, 170
flavor and quality, 173
flesh, 173
keeping quality, 174
seeds, 174
shape of cluster, 170

Grape, study of varieties — *Continued*
size and shape of berry, 173
size of bunch, 169
skin, 173
Grape varieties
labrusca
Brighton, 102, 175
Campbell, 175
Catawba, 102, 176
Concord, 102
Delaware, 101, 176
Herbemont, 177
Moore, 102, 177
Niagara, 102, 177
Sultanina, 102
Tokay, 103
Winchell, 102, 177
Worden, 101, 178
muscadine
James, 178
Scuppernong, 178
Thomas, 178
vinifera
Alexandria, 179
Alicante Bouschet, 179
Black Corinth, 179
Emperor, 179
Malaga, 180
Sultanina, 180
Tokay, 180
Grapes
foliage and fruit characters, 100
labrusca group, 99
plant characters, 94, 99
vinifera group, 100

L

Loganberry, adaptation, 191

N

Natural classification, 65, 74
Nectarine, 105
Nomenclature, 264
binomial system, 264
code of American Pomological Society, 267
Nomenclature — *Continued*
code of Vienna, 265
naming of species, 265
priority, 270
rule of convenience, 269
varieties with foreign names, 269
Nut fruits, 250
almonds, 259
hull, 260
kernel, 261
selection of varieties, 261
shell, 260
size and form, 260
varieties
California, 262
Drake, 262
Eureka, 262
IXL, 262
Jordan, 262
Ne Plus Ultra, 262
Nonpareil, 262
Texas, 262
pecans, 256
external characters, 257
kernel characters, 257
shell characters, 257
tree characters, 257
variety adaptation, 256
varieties
Alley, 258
Burkett, 258
Green River, 258
Halbert, 258
Pabst, 258
Schley, 259
Stuart, 259
Success, 259
Warrick, 259
walnuts
external characters, 250
kernel characters, 251
shell characters, 251
tree characters, 252
varieties
Concord, 253
Ehrhardt, 253
Eureka, 254
Franquette, 253, 254

Nut fruits — *Continued*
Grove, 254, 255
Payne, 255
Placentia, 252, 255

P

Peach, study of varieties, 105
adaptation, 109
color, 107
disease-resistance, 109
flavor and quality, 108
flesh, 107
foliage characters, 109
glands, 109
shapes, 106
sizes, 106
skin and pubescence, 107
stones, 108
suture and cavity, 107
tree characters, 108
Peach varieties
Belle, 110
Carman, 111
Champion, 111
Crosby, 112
Early Crawford, 112
Elberta, 112
Fitzgerald, 112
Greensboro, 112
Hale, 113
Late Crawford, 113
Muir, 114
Salway, 114
Peaches, classification of, 133
keys, Upshall's, for nursery certification, 135
Price-Onderdonk peach races, 133
North China, 134
Peen-to, 134
Persian, 134
South China, 134
Spanish, 134
Pear, calyx, 58
Pear, fruit study of varieties
color, 56
core characters, 58
flesh and flavor, 58
Pear, fruit study of varieties — *Continued*
shape, 53, 54, 55, 57
size, 53
skin, 56
stem, 56
technical description, 58
Pear, tree characters, 46
Pear varieties
Angoulême (Duchesse d'Angoulême), 49, 61
Anjou (Beurre d'Anjou), 50, 61
Bartlett, 47, 59, 60
Bosc (Beurre), 48, 60
Clapp (Favorite), 48, 60
Comice (Doyenne du Comice), 50, 61
Diel, 64
Howell, 63
Kieffer, 47, 59, 61
Le Conte, 50, 62
Louise (Bonne de Jersey), 49, 63.
Seckel, 48, 62
Sheldon, 49, 62
Vermont Beauty, 50, 63
Vicar (of Winkfield), 63
Winter Nelis, 51, 63
Pear, variety adaptation, 59
Pears, classification of
Chinese Hybrid, 83
European, 83
Plum, fruit study of varieties
bloom, 87
cavity, 85
color, 87
flavor and quality, 88
flesh, 87
form, 85
season of ripening, 88
size, 85
skin, 87
stem, 86
stone, 88
suture, 86
Plums, classification of Damson
Bullaces, 126
Damson, 126
Mirabelles, 126

Plums — *Continued*
St. Julians, 126
Plums, common or domestica, 125
Plums, groups of domestica
Gage, 126
Imperatrice, 126, 129
Lombard, 126
Prune, 126
Plums, Japanese, 124, 129
Plums, native, 124, 129
Plums, tree characters, 94, 95
Plum varieties
Abundance, 95
Arch Duke, 90
Bavay, 90
Bradshaw, 90, 97
Burbank, 89, 95
De Soto, 92
French, 92, 98
Grand Duke, 91, 98
Italian Prune, 91, 97
Lombard, 91, 98
Monarch, 91, 98
Pond, 92
Red June, 89, 96
Satsuma, 89
Shropshire, 92, 98
Wayland, 93
Wickson, 96
Wild Goose, 93
Yellow Egg, 92
Pomaceous fruits, classification of
Cydonia oblonga, 66
Pyrus baccata, 66
Pyrus communis, 66
Pyrus coronaria, 66
Pyrus ioensis, 66
Pyrus malus, 66
Pyrus serotina, 66
Pome fruits
age of coming into bearing, 43
bark characters, 39
biennial bearing, 41
disease susceptibility, 42
growth habits, 39
hardiness to cold, 43
leaf characters, 39
Pome fruits — *Continued*
twig characters, 39
Prune, 125

Q

Quince, 60

R

Raspberry
adaptation, 185
color, 182
drupelets, 183
flavor and quality, 184
plant characters, 184
receptacle, 184
Raspberry varieties, 182
Blackcaps
Cumberland, 185
Gregg, 185
Plum Farmer, 185
Purples
Columbian, 185
Shaffer, 185
Reds
Antwerp, 185
Cuthbert, 185
Herbert, 185
June, 185
Marlboro, 185
Perfection, 185
Ranere, 185
Yellows
Golden Queen, 185

S

Small fruits, classification of
blackberries, 220, 224
blueberries, 221, 227
cranberries, 221, 227
currants, 221, 226
Black, 227
Cherry or macrocarpum, 226
Garden and hybrids, 226
Northern red and hybrids, 226

Small fruits — *Continued*
ribes petræum and hybrids, 226
Dewberries, 221, 224, 225
Gooseberries, 221, 227
Grapes, labrusca or common American, 220, 222
muscadine, 220, 223
vinifera or Old World, 220, 221, 222
Huckleberries, 221, 228
Raspberries, 220, 223
Strawberries, 220, 228
Small fruits, species grouping, 220
Southern fruits, 230
avocado, 244
comparison of varieties, 245
tree characters, 246
classification of species, 231
fig, 246
caprifigs, 246
classification of varieties, 246
common, 247
San Pedro, 247
Smyrna, 246
olive, 247
variety characteristics, 248
pineapple, 248
variety characteristics, 248
grouping, 248
Strawberry
adaptation, 193, 194, 196
color, 196
flavor and quality, 197
market demands, 198
plant characters, 197
seeds, 196
shapes, 194, 196
Strawberry — *Continued*
size and shipping quality, 197
Strawberry varieties, 193
Aroma, 199
Belt, 200
Bouquet, 201
Chesapeake, 200
Dunlap, 199
Gandy, 199
Glen Mary, 200
Joe, 201
Klondike, 199
Marshall, 200
Missionary, 200
Premier, 200
Systematic pomology, development of
earliest written records, 3
history, early, 3
binomial system, 4
herbals, 4
variety descriptions, 4
history, modern, 5
chemical and physical study, 7
nursery certification, 6
teaching methods, 7
Swiss lake-dwellings, 1
carbonized apples, 1, 2
carbonized pears, 1
cherry seeds, 3
damson plum seeds, 3
vinifera grape seeds, 3

V

Variety-certification, 40, 109, 135, 205

634
D759

634.D759

a39001 007441564b

56788